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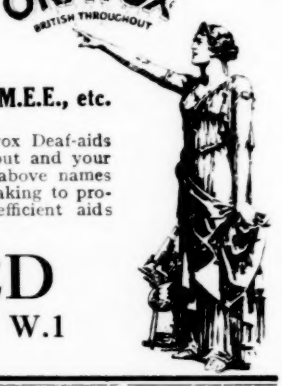

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Delivered before the British Medical Association at Manchester on July 26th, 1929,

BY A. V. HILL, F.R.S.,

FOULERTON RESEARCH PROFESSOR OF THE ROYAL SOCIETY.

MAN is an inveterate experimenter. Those of us who have been happy enough to see small boys at work, who have been small boys ourselves, or indeed are still small boys, will know what joy is found in taking an old alarm clock to bits or a bicycle to pieces, in seeing how fast we can run a hundred yards, in breeding rabbits, pigeons, or canaries, in fixing wireless apparatus together, or, when we are older, in trying a new kind of oil or petrol or even a new kind of medicine. Boys and men, however—by which I mean also girls and women—are not the only experimenters to be found in nature, as any who have watched a kitten or a parrot will know; and experiments made by monkeys have been scientifically studied. Man, however, is the chief experimental animal, both as experimenter and "experimentee." Indeed, in many of man's most joyful adventures he acts in both capacities; he makes experiments upon himself, often to his own great danger or discomfort.

MAN THE EXPERIMENTER.

To run in a Marathon race or to try to swim the Channel, to see how far one can ride a bicycle in 24 hours, to climb to 20,000 feet, to set out to walk (or to fly) to the South Pole, to make a height record in an aeroplane, to dive under the sea, all these involve trials and experiments upon oneself; which is one reason why so many apparently useless feats are performed. Every new adventure on which man has embarked throughout the ages, every change in his social and economic and political condition, has meant experiments upon his bodily frame and organisation, experiments sometimes successful but often followed by disaster.

In learning the use, treatment, and preservation of food he must, unwittingly often, have made millions of experiments upon himself, thousands of them extremely unpleasant, many of them fatal. Without these experiments, however, the present order of civilisation, depending as it does upon a regular supply of food, would have been impossible. When he set out to journey on the sea he experimented on sea-sickness, and later on, as his journeys lengthened, on scurvy and the need of vitamins. When he deserted a natural diet and gathered together in cities he experimented on nutrition and the physiological effects of radiation (or its absence), with rickets as a curious result. When he began to dig deep tunnels, or to work in diving bells or diving suits, he discovered that considerations of the physical solubility of gases in his blood and tissues may affect his well-being, and he invented caisson disease. When he climbed high mountains, or went up in balloons, he discovered mountain sickness, and acclimatisation to it. When he took to rapid manœuvres in aeroplanes he found out that the human factor is a limiting one, that violent acceleration—"centrifugal force"—may play havoc with his circulation and render him suddenly unconscious. Labouring in hot mines, in extremes of climate, with excess or deficiency of sunlight; living on sterilised, preserved, or purified food; breathing quartz dust or carbon monoxide; working with materials which exert a chronic irritation on the skin, or with ultra-violet light, or with X rays and radium; in all such experiments he found limitations to his independence of his external environment; he made experiments upon himself and others, experiments involving ill-health, disaster, and death to many. Even apart from disease, from the experiments which Nature wantonly insists upon making on us, we cannot avoid making experiments on ourselves if we are to do anything new; and, even if we do nothing new, we shall probably find we must make experiments still to discover how to remain just as we are.

NATURE THE EXPERIMENTER.

I am speaking this evening to those, and the friends and relations of those, who spend their lives in mitigating the results of the experiments which Nature makes upon suffering mankind. Some of these experiments involve bacterial infection and, therefore, are, or will be, to some degree avoidable. Others have no known cause, though some day their character too will be revealed. Others are due to functional disturbances in the mechanism—i.e., in the biochemistry and biophysics of the living cells of the body. Some are due to gross lesions which can be seen. Every imaginable ill, great or small, every conceivable torture, physical or mental, you are called upon to witness, and to attempt to alleviate. Some of this suffering is unquestionably due to human folly; some to man's insistence—no doubt for perfectly good reasons—upon living in a civilised industrial state; some to what we call accident—which usually means insufficient skill, or a disregard for human safety. Much sickness is avoidable, and *would* be avoided if only questions of public health and infant welfare were taken seriously enough. Many diseases, however, and their consequences, cannot be prevented altogether, until at any rate we know much more than we do to-day. You can predict the course of the disorder when once it is apparent; you can mitigate its evil consequences; sometimes even you can cure it; but at present you cannot tell us how to avoid it altogether.

Now each of your patients represents an experiment performed by Nature, often apparently a cruel and ruthless experiment, and you—her laboratory assistants—are given a variety of them to witness and to try to learn something from. Nature, however, is an extremely bad experimenter; she is, in fact, the imaginary vivisector of antivivisectionist literature, whose experiments are made without mercy and without apparent cause. So badly and so casually performed are they, so ill-controlled, that it is often impossible for you to reason accurately from them at all. Small wonder that for thousands of years medical knowledge advanced so relatively slowly, when it had to be based only on experiments such as those which Nature provides. For, as all who have tried to reason from experiments have found, these may be good or they may be bad; so well made on the one hand, so carefully thought out and prepared before the event, that one may draw sure and decisive conclusions from them; or, on the other hand, so ill-conditioned, so casually performed, that no certain deduction is possible. In most of Nature's experiments the variables involved are all confused with one another; the factors at work cannot be disentangled; half a dozen functions have been interfered with at one and the same time; the results are not clear cut, and an extraordinary degree of judgment and experience is required before you can reason from them at all.

This cannot indeed be otherwise. To your individual patients you have a duty to perform which is greater than your duty to the rest of mankind. The only way in which the confusion may be avoided is by comparing the results of Nature's casual, random, and complex experiments on human beings with those of simple, properly controlled experiments on living animals. Such a comparison is the means by which in the last few hundred years, and especially in the last seventy-five, medical science has made such startling progress. You can observe, within certain narrow limits prescribed by ethical considerations you can experiment on, man; the idea of the use of criminals for dangerous experiments, common in the past, is repulsive to-day. In any case, fortunately, the supply of criminals would be inadequate! To

acquire a real knowledge of the factors at work, these observations, these limited experiments possible on your patients or yourselves, *must* be compared with the results of simpler experiments on animals, in which it is a matter of little moral importance if the patient dies.

THE EXAMPLE OF CLAUDE BERNARD.

Many of you will have read with pleasure and instruction "An Introduction to the Study of Experimental Medicine," by Claude Bernard. As Lawrence Henderson says in the introduction to the English translation: "The discoverer of natural knowledge stands apart in the modern world an obscure and slightly mysterious figure." To some he is a magician; to others he is a sort of stage professor, with blue spectacles and a long beard, forgetful and untidy; to a number (including Mr. Bernard Shaw) he is a criminal or a fool; to the majority he is almost entirely negligible, until the newspapers make some preposterous stunt about him, when he receives unwanted attention for a few weeks. "Whoever fails to understand the great investigator can never know what science really is. . . . Not the least merit of Bernard's book is that we have here an honest and successful analysis of himself at work by one of the most intelligent of modern scientists."

I cannot do better than quote what Bernard says about the experimental method: "Man is metaphysical and proud. He has gone so far as to think that the idealistic creations of his mind, which correspond to his feelings, also represent reality. Hence it follows that the experimental method" (by which of course Bernard means not merely the *making* of experiments, which is easy, but the art and science of experimentation, which is difficult) "is by no means natural to man, and that only after lengthy wanderings in theology and scholasticism has he recognised at last the sterility of such efforts. . . . The human mind has at different periods of its evolution passed successively through *feeling*, *reason*, and *experiment*. First, feeling alone, imposing itself on reason, created the truths of faith or theology. Reason or philosophy, the mind's next mistress, brought to birth scholasticism. At last, experiment, or the study of natural phenomena, taught man that the truths of the outer world are to be found ready formulated, neither in feeling nor in reason. These are indispensable merely as guides: but to attain external truths we must of necessity go down into the objective reality. . . . In the search for truth by the experimental method, feeling always takes the lead: it begets the *a priori* idea or intuition: reason or reasoning develops the idea and deduces its logical consequences. But if feeling must be clarified by the light of reason, reason in turn must be guided by experiment."

In these words lies the philosophy of the great experimental physiologist, whose work and outlook are bearing at last such rich fruit in experimental medicine. It may seem curious that the bearing of that fruit has been so long delayed. Henderson is probably right in seeing in the growth of bacteriology, following on the discoveries of Pasteur, the cause which drew men's attention away for a time from the more fundamental study. The magnificent edifice of bacteriology is not yet complete, but one's mind's eye can grasp already what its dimensions, its plan, its proportions, its significance are to be. Thought is returning to Bernard's conception of medicine as an experimental biological science, of which, as he rightly said, zoological vivisection is, and is likely to remain, an integral part.

Let me take an example from Bernard's own work to illustrate how a few controlled experiments on living animals may shed light on the countless uncontrolled experiments of Nature on living man. The existence of vasomotor nerves, the control of blood-vessels by the innervation of the muscle-fibres that lie around them, are matters of ultimate importance, not only in our understanding of bodily functions, but in dealing with the phenomena of disease. In 1851 Bernard made his first communication on the effect of dividing the cervical sympathetic nerve in the neck of a living animal. The ensuing rise of temperature on the affected side, a surprising and quite unexpected phenomenon, led by a long series of researches directly to our knowledge of the vasomotor system. It is almost impossible, as Michael Foster says, to exaggerate the importance of the result, the influence which it "has exerted, is exerting and in widening measure will continue to exert, on all our physiological and pathological conceptions, on medical practice, and on the conduct of human life. Whatever part of physiology we touch, be it the work done by muscle, be it the various kinds of secretion, be it the insurance of the brain's well-being in the midst of the hydrostatic vicissitudes to which the changes of daily life subject it, be it that maintenance of bodily temperature which is a condition of the body's activity: in all these, as in many other things, we find vasomotor factors intervening." In inflammation and in fever, in shock, in any of the disordered physiological functions which constitute disease, whatever be the tissue, vasomotor influences have to be taken into account.

All this dominant knowledge has come from Bernard's initial experiment in cutting the cervical sympathetic nerve. A simple experiment on a living animal suddenly brought a great light into a field where men had been groping in vain with the help only of clinical observation. The result of the experiment was the first clear light which broke upon the subject: and it was the following up of the teaching of the experiment which supplied the interpretation of the hitherto obscure clinical facts.

As Foster rightly claims, we must insist that the experiment in question was what is called, as though it were a term of abuse, a vivisectional experiment: an experiment which many would prevent us from performing to-day, willing though they be, when they go to the doctor, to profit by similar experiments in the past. Such experiments are sometimes declared to be needless, since the knowledge gained by them *might* be arrived at in other ways. It is true that in the course of time, experiments made by Nature, or by accident, on human beings, *might* have suggested to some quick mind that nerve-fibres do act on blood-vessels, and how they act. The unbiased inquirer will admit this, but he will also acknowledge that up to the day of Bernard's experiments all the experiments which a seemingly cruel Nature had carried out year after year, and day after day, on millions of suffering men and suffering animals, passed before the eyes of eager observers without suggesting anything more than the dimmest idea of such an action of nerve-fibre on blood-vessel. And he will also admit that a single stroke of Bernard's knife—a stroke bringing pain which shrinks into insignificance compared with the pain which it has been the means to spare—laid bare a truth which all Nature's cruel experiments on myriads of men and animals for half a million years had not, in fact, succeeded in bringing to light.

All this our unbiased inquirer will admit. Whatever antivivisectionists may say about the might-have-beens, about the way in which some superhuman intelligence *should* have been able to see the truth without the aid of experiment, there remains the plain, simple historical fact that this discovery, with all its bearing on health and disease, had its origin in Bernard's initial experiment on a living animal. I have recalled, almost without paraphrase, what Foster wrote in 1899. It is no less true in 1929. Would anyone dare to-day, had he the power, to *give* the pain which Bernard's discovery abolished, in order to *save* the pain by which the discovery was made? If so, he may call himself a friend of animals, but he is an enemy of mankind.

THE VALUE OF ANIMAL EXPERIMENTATION: HARVEY AND BERNARD.

We hear so much objection raised to-day to the use of living animals, for experiments designed to solve the problems which medicine and physiology supply,

that one must continue to insist that nearly all fundamental knowledge in the medical sciences has, in fact, arisen from such experiments. In the dedicatory epistle of "De Motu Cordis," addressed to that "most excellent and most ornate man," the President of the College of Physicians in London, William Harvey, speaking of the experiments on living animals by which he had for many years demonstrated the fact of the circulation of the blood, remarked: "Neither do Philosophers suffer themselves to be addicted to the slavery of any man's precepts, but that they give credit to their own eyes; nor do they swear allegiance to Mistress Antiquity, as openly to leave their friend Truth. For as they think them credulous and idle people, who at first sight do receive and believe all things, so do they take them for stupid and senseless that will not see things manifest to the sense, nor acknowledge the light at midday. . . . Likewise all studious, good and honest men do never suffer their minds so to be o'rwhelmed with the passions of indignation and envy, but that they will patiently hear what shall be spoken in behalf of the truth or understand anything which is truly demonstrated to them; nor do they think it base to change their opinion, if truth and open demonstration so persuade them." If only the precept of these words could be heeded by those who object to the experiments of Harvey and his successors!

When Harvey, as he said, "first applied his mind to observation from the many dissections of living creatures as they came to hand" to find out the nature of the motion of the heart, he "straightways found it a hard thing to be attained, so that he could almost believe that the motion of the heart is known to God alone." At last, however, "using daily more search and diligence, by often looking into many and several sorts of creatures, I did believe I had hit the nail on the head and thought I had gained both the motion and use of the heart, which I did so much desire."

And so, by the vivisection as he says of "toads, serpents, frogs, house-snails, shrimps, crevisses, and all manner of little fishes," together with eels, dogs, swine, doves, chicken embryos, crabs, wasps, hornets, gnats, bees, geese, rats, sheep, adders, lice, swallows, partridges, hens and swans, modern physiology and modern experimental medicine were born. For those who, in Harvey's words, are not "stupid and senseless," who are ready to "acknowledge the light at midday," we have here one of the greatest discoveries of all time; a discovery greater even than that of the circulation of the blood; the discovery that by comparative experiments on "many and several sorts" of living creatures we may reveal the nature and working of man's body, we may increase his power and happiness and wisdom, and cure and protect him from suffering and disease.

This lecture has been entitled "Experiments on Frogs and Men." The physiologist's little friend the frog has been chosen as the general type of the experimental animal, and I have just read you a list of all its colleagues which William Harvey employed in his discovery of the circulation of the blood. In using these various animals he assumed, unconsciously, what we now know to be a fact, the fact (I do not call it the theory) of evolution. He realised, being a sensible person, that the hearts of snakes or crabs, of snails or fishes, do not differ so much from those of the higher animals and man, that an investigation of the former would throw no light upon the latter. There *are* differences of course; no reasonable man supposes that by studying the circulation, or, indeed, any function, in the frog or even in the dog alone, we shall learn enough to make us competent physicians. The differences, however, are often more apparent than real; the fundamental properties of the ultimate living units—that is, of the single cells which build up the various organs—are surprisingly alike. By the methods of comparative physiology, or of experimental biology, by the choice of a suitable organ, tissue or process, in some animal far removed in evolution, we may often throw considerable light upon some function or process in the higher animals, or in man.

The Further Range of Discovery: Deficiency Diseases.

I have spoken of two discoveries of the more distant past, those of Harvey and Bernard, which were made by the aid of experiments on animals, discoveries on which the practice of medicine to-day is based. Where would you be if you did not know or would not acknowledge the circulation of the blood? How would your patients fare had you never heard of the control of blood-vessels by nerves? To refer to other discoveries, how safe would surgery be to-day had the researches of Pasteur on animals and their applications by Lister on men never been made? When you take a blood pressure, do you or your patients give full credit to the Rev. Stephen Hales, who laid the basis of that particular science, by experiments on living animals performed in the parsonage at Teddington? Do those whom, by a miracle of skilful surgery, you save from the misery of hyperthyroidism and restore to normal health realise that our knowledge of the thyroid gland and the possibility of this particular operation are due alike to the so-called vivisection of animals and men? Brain surgery, renal surgery, the surgery of the nerves, the spleen, the pancreas, the stomach, the ligature and suture of arteries, the use of artificial respiration, the treatment of anthrax, rabies, diphtheria, tetanus, and syphilis (to name only a few); the researches which led to all these were intimately bound up, from first to last, with experiments on, with the vivisection of animals, as well as men. This is a matter—as Foster said about Bernard—of plain historical fact, which those who wish may verify. No manner of abuse or misinterpretation will get over a plain historical fact. Is there a fool so great, or a criminal so wicked, that he would be willing now to *cause* the suffering to men and women which these advances in medical and surgical knowledge have already saved—and will save in the next 50 million years—in order to *prevent* the suffering to animals, such as it was, by which, once and for all, they were achieved?

In 1889 Mering and Minkowski found that complete removal of the pancreas in animals is followed by severe and fatal diabetes, and a long series of experiments led to the conviction that some chemical substance, prepared by certain patches of cells, the so-called islets of Langerhans, existing in that organ are essential to the normal utilisation of sugar by the body. So certain did this seem that—although all attempts to isolate it had failed—the name "insulin" was given to this hypothetical substance by de Meyer, in 1909, and independently by Schafer, in 1916. I need not tell you how the Toronto workers in 1922—only seven years ago—succeeded in isolating this substance, and how effective it has proved in the treatment of human diabetes. Those of us with friends and relations who are maintained in practically normal health by the daily administration of insulin, and who—in all human certainty—would die in a few months were the supply of insulin prevented, can appreciate what experiments on animals have done. Not only did the discovery of insulin rest absolutely upon experiments on dogs, rabbits, and other animals, but even its supply cannot be maintained at present, until scientific knowledge of its nature is advanced much further, without continual experiments on mice and rabbits, for its standardisation. This again is plain historical fact. There are people who assert, and affect to believe, that insulin has no effect on diabetes, or that, in fact, it does harm; they base their assertion on the crude handling of statistics. There are still people who believe that the earth is flat, and that spirits can make images on photographic plates. Have those who protest against insulin ever seen a patient, sick unto death in diabetic coma, pulled as by a miracle out of his sickness and restored to health? Would they dare to condemn to death a healthy happy man, in active work, a man such as many of us know,

but a complete diabetic, by refusing him his daily dose of insulin because it has to be tested and standardised on rabbits or mice? The question really needs no answer; ultimately these are humane people, though they have bees in their bonnets.

It is only three years since the experiments of Whipple on the regeneration of blood corpuscles by dogs, bled and then fed on liver, led to the discovery that pernicious anæmia can be averted, if not cured, by feeding human patients with the same substance, or by treating them with liver extract. It is healthy, I know, to have a certain mistrust of "experts," but it is healthier still to have a mistrust of fools. Those who are qualified to judge, and have seen the evidence, are convinced of the efficacy of this treatment; they have no shadow of doubt about it, and it is plain historical fact again that it was led to by experiments on animals. Unfortunate, maybe, but true! Yet a medical man I once met, a valued member of an antivivisectionist society, asserted in my hearing that the liver treatment of pernicious anæmia is a delusion, since in fact there is no such disease at all; according to him it is really cancer of the bone-marrow—whatever that means (and he himself has a cure for cancer). Whose opinion should the public accept in this matter, which after all is not altogether unimportant since it involves quite a number of human lives?

We hear a great deal in these days about vitamins: the public enjoys the word, especially in America. I once had the privilege of sitting at dinner between two distinguished members of the advertising profession. One, I believe, was an arch bill-poster, the other I found later was concerned with the advertisement of patent foods. Neither knew who I was. The first began: "When I sit down next to a stranger I generally open the conversation by asking him, 'Do you know my distinguished cousin?'"—naming one of the greatest of living investigators. I did, and conversation progressed favourably, finally leading to vitamins. When I turned to my second neighbour I told him how conversation had opened on my other side, and how, of course, it had turned to vitamins. He replied that vitamins were the curse of his existence, that he wished they had never been discovered, that their discoverer was a criminal and ought to be locked up, and so on. He seemed in other respects a reasonable and healthy man, so I made further inquiries. It appeared that in every patent food vitamins have to be present—at any rate in the advertisement—and it gives him sleepless nights wondering how the word (not necessarily the substance) can be introduced. It is true, alas, that any new knowledge can be abased and exploited for commercial purposes, yet it remains a fact that many children and many adults in Great Britain *are* suffering from vitamin lack. Walk through the poor streets of many a great city—I will not say Manchester—at an hour when the children are not in school, and see how many you can spot who are suffering from obvious rickets. Now rickets can be cured—cod-liver oil or radiated ergosterol will cure it—at infinitesimal expense compared with the end to be gained. There is no excuse for rickets any more in a civilised community.

Other deficiency diseases are known—beri-beri, scurvy, &c.—but apart from definite disease, it is probable that many defects or weaknesses, not amounting to definite disease, are due to vitamin lack. We still do not know what most of these substances are, but a means of testing and controlling their activity is available in the feeding of animals. The discovery of vitamins was made by experiments on animals—though I admit that scurvy was discovered inadvertently, and a cure for it invented, by experiments on sailors. My friend, Prof. Elliott, once said to me that to Hopkins, for his work on nutrition and accessory food factors, medicine would owe more than to anyone since Pasteur. I at any rate can testify that Gowland Hopkins's researches involved experiments on animals—did I not work for several years in a coal-cellar at Cambridge, in the company of several hundred of his rats? I never saw him maltreat them—in fact, I have good reason to believe him to be the most kind-hearted of men—but this is "vivisection," to give it its legal title, and Hopkins's discoveries were made by "vivisection" in a coal-cellar. I am happy to have lived among the rats of such a "vivisector," and to have seen such a discovery emerge.

These matters are not unimportant. Human lives and human happiness are involved. Look up the history, recent or remote, of medical knowledge and treatment, explore the story of any medical discovery, and you will find experiments on men and experiments on animals inseparately mingled. It cannot, and it should not, be otherwise. *Anti-vivisection, in fact, is anti-scientific medicine;* and those who work in laboratories need a fearless recognition of the fact by those who work on patients. Your rewards, social and financial, are not usually less than theirs; it is you who have the ears of our rulers, whether in cottage or in mansion; they remain, to the public, obscure and somewhat mysterious people; it is you, in fact, and not they, who can stop, if anyone can, the crime of hindering or preventing medical progress by means of scientific experiment. The object of our opponents is frankly to put an end to medical research, in so far as animals are used, instead of men, for experiment. They say so openly. You reply that this is inconceivable. It is not inconceivable; it might very well happen. There are States in America where even the teaching of evolution is forbidden. Do not let England become the laughing stock of the world, like Tennessee!

The Physiology of Sensation.

But enough of these unpleasant and futile controversial matters; let us turn for a moment to something of more interest. You have probably all wondered how it is that some things provoke you more than others, how you recognise things as hotter, colder, heavier, lighter, darker, more or less painful. The fact that you can distinguish pain from cold, or light from sound, is simple to explain—each has a specific kind of receptor, each sends in its messages to the nervous system along a different line. All the evidence, however, as garnered from innumerable experiments upon the nerves of frogs, tends to show that a nerve-fibre transmits its messages in an *all or none* way. Nervous activity consists of discontinuous waves, just as the pressure of a gas is due ultimately to bombardment by its separate particles. Now these waves cannot be varied in degree by varying the stimulus—a stronger stimulus does not produce a greater wave in the nerve, provided it produces one at all. How do we recognise a stronger stimulus, as we certainly do? We have indeed the finest appreciation of changes in our environment and in ourselves. The physiology of sensation, and of reflex and voluntary muscular response, together with our theories of the pathology of the nervous system, depend vitally upon an answer to the question—how are we aware of variations of intensity in a stimulus applied to a sensory end-organ?—and until a very few years ago no response was forthcoming. All our philosophy of the sensory relations of the human body to its environment depends upon the answer.

The physiology of the frog's nerve, most carefully and fully studied, seemed inadequate to explain this most obvious characteristic of the human nervous system. What an opportunity for scorn for those who expect research to be instantly followed by practical application! And yet, lying in this mass of exact data obtained on the isolated nerve of the frog, and on the generalisation built upon it, lay the means, as soon as the modern amplifying valve was applied to the action current, to open up a new field of physiology of great practical importance and of intense theoretical interest.

The nerve impulse had long been known to be accompanied by an electric change in the fibre in which it travels; this impulse lasts for approximately a thousandth of a second at any spot; it is of the order of size of a few milli-volts, but in a fibre embedded in a nerve trunk it is largely short-circuited, and the

external effect to be recorded is very small indeed. Without amplification it is difficult enough to record a single wave in a whole nerve trunk with any accuracy, to record it in a single fibre is utterly beyond the reach of any available instrument. With the aid, however, of the tools which wireless engineers have provided, single nerve waves in single nerve-fibres can be amplified and recorded, and a whole new world of hurrying, scurrying activity is opened up to analysis.

The opening up of this new world is chiefly the work of Prof. Adrian and his pupils, and the answer to our question is at once apparent. The sensory end-organ records a greater strength of stimulus by a *greater frequency* of response. A heavier pressure on the skin sets up a greater number of nerve messages per second in the fibres running into the nervous system; a brighter light, a greater tension in a muscle, a hotter body, a stronger pinch or prick, are registered by a greater frequency of the impulses evoked by it. The experiments, conducted with splendid simplicity and skill, have left no doubt of the quantitative nature of sensory response. Not only can the separate waves in an afferent nerve-fibre be registered photographically, but they can even be transformed into sound and heard in a loud speaker. The physiology of sensation has taken a new jump forward, and nobody with a particle of scientific imagination can doubt that this new knowledge will have important bearings upon the pathology of nerve affections.

This work, however, has developed not only on the afferent or sensory, but also on the efferent or motor side of the nervous system. For a quarter of a century it has been believed that the only way in which the strength of a muscular response can be graduated is by a graduation of the *number* of muscle-fibres involved in it. All skilled movements, all fine work, the economy and precision which are rightly so much esteemed in the trained performer, which are lost in various disorders of the nervous system, all depend upon this precise grading of muscular effort. It seems now from Adrian's work that variation of the number of fibres involved in a muscular response is only the *coarse* adjustment; the fine adjustment is due to a graduation of the frequency with which the muscle-fibres are excited by their nerves. Here, again, in its bearings upon our theory of the working of the nervous system, we have a very fundamental fact. Such facts have been established by experiments on frogs, eels, rabbits, and cats—by "vivisection," that is to say, to give it its official title—though I am sure that no pain, worthy of the name, has been caused by them. They have been confirmed by experiments on men. At a meeting of the Physiological Society, Prof. Bronk, a collaborator of Prof. Adrian, had a fine electrode thrust into an arm muscle, and the resulting action currents were led off to an amplifying system and thence to a loud speaker. As he varied the force exerted by his muscle, the pitch of the sound emitted by the loud speaker waxed and waned; at first a rattle like a machine gun, and finally a musical note; one *heard* a single human muscle-fibre varying the strength of its contraction. No doubt the result *might* have been attained by a superhuman intelligence, without preliminary experiments on animals; it is a matter, however, of simple historical fact that it was not so attained, but that experiments on frogs and tortoises and eels, on dogs and cats and rabbits, were the *actual* path by which the result was reached. If anyone dares to assert that it is unimportant, the history of all scientific thought is against him. Indeed, if the understanding of anything at all in man's universe is important—which, of course, some people deny—it is of his own central nervous system.

The Central Nervous System.

Let me illustrate the matter further by a recent experience of my own. It is known that the extremely complex functions of the central nervous system depend upon an adequate supply of oxygen, that without oxygen they rapidly fail. It is known that central nervous activity is readily modified by fatigue. Now in trying to discover the fundamental nature of the activity of the nervous system we need something simple to work with; the central organ itself is so utterly out of reach of direct experiment, so hopelessly changed by isolation or interference, that we can do little but fire messages in, in various ways, and observe what comes out again. The study of the spinal cord and brain has become, in fact, the study of reflexes, whether automatic or conditioned, a study which in the skilful hands of Sherrington, Magnus, Pavlov, and many others, has opened new vistas of research and knowledge and promised—or indeed begun to provide—a rich harvest to the neurologist. The magnitude of their achievement I should be the last to under-estimate, but they would be the first themselves to recognise that their methods alone cannot solve the whole problem. What are the individual cells and fibres doing during activity? What are the physico-chemical changes involved in excitation, inhibition, and facilitation in the central organ? What *is* the central excitatory state revealed by Sherrington's experiments? Can we give some picture of the central nervous system based upon the elementary properties of the isolated nerve? A very difficult problem, which many people have tried and are trying to solve.

Let us consider an analogy. For centuries the movements and properties of the heavenly bodies have been studied. Astronomical discovery is perhaps the noblest monument to the human intellect. To-day, however, the flood of light which is being poured afresh upon the dimensions and time-relations, the history and evolution of the universe has resulted, not chiefly from astronomical observation as such, but from the labours of physicists in their studies of radio-activity, of spectra, and of the conduction of electricity through gases, and of mathematicians in their theories of the interchanges of radiation and matter. In 1929 the picture which science gives us of the universe is based upon the properties of atoms, electrons, energy, and radiation. So it must be with the central nervous system. In the solution a necessary step is to learn in greater detail the properties of the central nervous cells and of the fibres which project from them; we need to know them not only by their works at a distance, but by near and personal acquaintance. Keith Lucas made a first attempt to explain the fundamental characteristics of the central nervous system on the basis of those of the medullated nerve-fibre of the frog, an experimental object whose clear-cut functions we can investigate methodically in the laboratory by rigorous physical methods. Lucas's attempt has not been wholly successful; although patches of light have been thrown upon central nervous function by work upon the isolated medullated nerve of the frog, there is still much that remains obscure.

It may be that a further little step, in this type of analysis, is possible. It happened by good fortune some three years ago, at the Marine Biological Laboratory at Plymouth, that I examined the limb nerves of Maia, the spider crab. Other people, of course, have done this before, but they did not chance to have a galvanometer at hand. The activity of this tissue can readily be measured by recording its electric response to stimulation. To our astonishment the nerve was found to be obviously and highly fatiguable. It is almost impossible, as you know, to fatigue a medullated nerve. Students make experiments to show that it cannot be done. The researches of my colleagues, Levin and Furusawa, have shown this non-medullated nerve of Maia to possess some most interesting properties—properties which one would like to see examined as the possible material for an analysis of the central nervous system. The nerve can be fatigued, almost to complete exhaustion, by stimulation for a few minutes. Fatigue at the point of stimulation is greater than at a distance from it. In the presence of oxygen it recovers; in the absence of oxygen it does not. At 16° C., 25 minutes are required for complete recovery, from six seconds only of stimulation. Only 2 per cent. of the energy involved in activity is liberated during the passage of the

impulses produced by excitation, nearly 98 per cent. in the succeeding 25 minutes of recovery. The normal resting state of the nerve is accompanied by an electrical potential difference across its surface. The potential difference is diminished or abolished by stimulation or by oxygen-want; here is an obvious and lasting effect of activity, which was not known at all in medullated nerve. In the presence of oxygen the potential difference is slowly restored, just as though it were due to a little accumulator which has to be recharged by a dynamo when it is run down. The energy used is many times as great as in the case of the medullated nerves previously examined. Hence perhaps the rapid onset of fatigue. There is evidence that the maximum frequency at which the nerve transmits its impulses rapidly decreases as activity continues.

Now the central nervous system consists largely of grey matter—that is, of nerve cells and of non-medullated nerve processes; only to a minor degree can its properties depend upon its medullated fibres. In the fatiguability, in the large amount of energy used, in the dependence on oxygen, in the varying degree of electric polarisation of its surface, may we not see in the crab's non-medullated nerve, more faithfully reproduced, the properties of the central nervous cells, than in the simple medullated nerve of the frog?

I realise that I am only guessing. Investigation as yet has not had time to enable us to do more. I am showing you, so to speak, Bernard's process of *feeling* at work. Nothing may come of it after all; feeling is often wrong. Only future research will show whether the comparison will prove fruitful, and I do not claim that any particular problem has been solved. I give you the comparison merely to illustrate a very early stage in scientific procedure. If, however, the guess proves to be right, we have here an example taken straight, so to speak, from the factory, of the principle which Harvey's work so fully emphasised of the advantage of trying your experiments "on many and several sorts of creatures," on any living animal on which you can lay your hands. The most unexpected creature in the world—even the spider crab crawling about at 20 fathoms—may help you to solve a riddle which would prove quite insoluble so long as your only experimental animal is man.

Experiment the only Way.

Is it indeed conceivable that we can find out about life without examining life? The whole history of human knowledge and progress tells us the danger and folly of scholasticism and unverified hypothesis, the advantage of unbiased experiment and observation. If you wish to find out about the stars you must observe the stars, you must experiment with the materials which you suspect the stars to contain, you must try to reproduce, and to experiment under, the conditions which obtain in the stars; you must study spectra, electrons, radiation, gravitation; you will not be content merely with pictures of the sky at night. If you want to solve the problems of flight you must experiment on flight; you will never solve them merely by examining dead birds or fossil birds, or even living birds in cages. If you want to understand the properties of matter you must make experiments with matter, and apply mathematical calculations to your results as necessary; it is not sufficient to read what the Greek philosophers said about matter. If you want to know how living things evolved you must examine the strata of the earth, in which you can find them in their various stages of evolution ready to look at. You must not be content with the first chapter of Genesis. If you want even to play tennis you must experiment in playing tennis—all the books in the world will teach you nothing without the practical experience. So, if you want to understand life and the problems involved in life, if you want to acquire the power which an understanding of living processes will bring you, you must observe living things, you must take them to pieces to see how they work, you must become familiar by long experience with the way they behave.

Living processes, as Bernard upheld, are subject to the same determinism as the phenomena of the inorganic world. Cause and effect are related in the same way. There are no spooks, no spirits, no magic, no supernatural agency, no lack of causal relationship to hinder us from applying the same kind of exact quantitative experimental analysis as men are accustomed to apply to the facts of physics, chemistry, engineering, or astronomy. The only difference is that the problems of physiology, taken in its widest sense, are far more difficult and complex that those of the so-called exact sciences. The problems of biology require greater and not less experimental skill, more patience and not less, more time to unravel, more judgment and more understanding for their solution. Biology is *not* a soft job, for people with second-best brains; though physicists and chemists sometimes affect to think so. There is no evidence, however, that its problems are not ultimately soluble. We may not solve, as the newspapers would say, the "mystery of the origin of Life"; any more than astronomers can tell us how the universe of matter, energy, and radiation came into being in the beginning. Probably there *was* no origin and there *was* no beginning; at least there is no evidence at all on the subject. The real difficulties in biology are great, but they are experimental difficulties, not philosophical ones. If we wish to understand life we must experiment with it, not talk about it. Our experimentation, of course, must be led to by hypothesis, for random experimenting is as useless, as dangerous, as unverifiable hypothesis; but when once we have appealed to Nature to judge between our theories, we must accept her decision, without bias of hypothesis, or philosophy, or religion. We must trust absolutely to experience, guided by reason. *We must admit no challenge to the arbitration of experiment, except better and better and still better experiment.* The field of biology is vast, much of it is still quite unexplored, but we have a few landmarks to guide us. The fact of evolution is certain, the fact of determinism, the fact that the laws of the inorganic world apply in biology with the same precision as elsewhere. The field is not ripe yet for much more theory—exact quantitative experiment on living creatures and tissues is the present need, and will remain so for many years to come.

How, then, shall we proceed? By experiments on man? Surely, for man is the only experimental animal who will coöperate fully with the experimenter, and most important results have been obtained in recent years by controlled experiments on man. Besides, the habit of experimenting on man, on themselves and their friends, is a valuable lesson to learn for all those whose lives are to be devoted later to medicine; and no less important should it prove in connexion with the scientific study of industrial and social welfare. Let us, however, insist and continue to insist that human physiology and medicine are branches of biology as a whole. Man has a kinship, through evolution, with all the plants of the earth, the beasts of the field, the birds of the air, the creatures of the sea. Fifty years ago this conclusion was opposed by all the resources of sentiment and of organised religion. Even to-day there is widespread objection among the uneducated to the teaching of evolution, but none on the part of those who have studied the evidence. We *are* akin to the other creatures, and a frank acknowledgment of the fact need not, in fact does not, diminish our appreciation of the nobility of human nature or of the sanctity of human life. One objection to the use of animals in experimental medicine is undoubtedly the same old anti-evolutionary prejudice. To-day, however, the conclusion cannot seriously be contested, Bernard is admitted to be right, medicine and human physiology *are* branches of experimental biology. We must make them so in fact as well as in theory, in hospital and laboratory as well as in lecture room.

Let us advance, therefore, by experiment, hopefully and without fear. Harvey, by his experiments "using daily more search and diligence, by often

looking into many and several sorts of creatures," did finally "hit the nail on the head" and so laid the basis of modern scientific medicine. To-day there are unlimited opportunities for experimental biologists, adequately schooled and disciplined in hard reasoning and exact methods, in its border sciences. From frogs to elephants upwards, from frogs to filtrable viruses downwards we may take our choice, according to the demands of the experiment; and the end of it is man. Puny, fearful, unreasonable, selfish he may sometimes be; yet possessing always elements of nobility, courage, kindness, and devotion such as no other animals possess, which make him, as was said 1900 years ago, "of more value than many sparrows." On his behalf, for his health, his happiness and his wisdom, for his freedom from suffering, superstition, and ignorance, experimental biology and experimental medicine should be ready to sacrifice, if needs be, many sparrows and many frogs.

TREATMENT OF CHOREA BY NIRVANOL.

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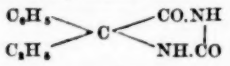
A NEW method of treating chorea with a preparation called nirvanol has recently had a fairly wide trial in Germany. In most clinics where the method has been used it has met with such constant success that it continues to be employed in severe and obstinate cases. Up to the present, knowledge of this form of therapy has failed to reach the shores of England or America, and we have been unable to find any reference to nirvanol in the literature of either of these countries.

During the last few months we have used the method in six cases of chorea, and have been sufficiently impressed with its favourable results to think it worth while to bring this new form of treatment to the notice of the English medical profession, so that it may receive more general trial in this country.

Nirvanol is composed of γγ-phenylethylhydantoin, and has the following formula:—



It is formed by the combination of urea and glycol, and was originally used as a hypnotic for sleeplessness and as a sedative in epilepsy and various types of psychosis. In chorea, relatively smaller doses are used, and successful results are not due to any hypnotic effect, but to a specific reaction which occurs after several days' oral administration. This reaction, on which the whole treatment depends, is akin to serum disease, or a mild anaphylactic shock, and is so distinct that it has been named nirvanol disease.

Method of Treatment.

The drug is administered by the mouth in daily doses of 0·3 g. for a child of 9 to 14 years of age. In most cases 8 to 14 days after beginning the treatment a well marked morbilliform rash appears usually accompanied by pyrexia. The drug is stopped directly this reaction occurs. The rash is at first composed of tiny red macules which, in the course of a day or so, enlarge and become slightly raised. The distribution varies, but usually the eruption is first noticed on the chest, abdomen, and elbows. From here it spreads to other parts of the limbs, the extremities being particularly affected, and spots are nearly always visible on the dorsum and soles of the feet, and sometimes on the palms of the hands. The back may be involved, but the face generally escapes. After about four or five days the rash gradually disappears, hardly having reached a definitely papular stage, and rarely becoming confluent except on the elbows. In our cases the rash always had this morbilliform character, but other observers have noted urticarial and scarlatiniform eruptions. There are few subjective symptoms, but conjunctivitis, pharyngitis, cervical adenitis, and slight œdema of the eyelids and face are apt to occur. Vomiting is uncommon, but there may be slight headache and drowsiness. The nirvanol rash does not usually irritate and, accompanied by these other slight manifestations, is strikingly like rubella. Its tinge, however, is not the typical pink of this infection, and more closely resembles a mild attack of measles, although the absence of true Koplik's spots is a valuable differentiating sign. In fact, this peculiar rash is best described as falling between these two exanthemata, not quite resembling either in some of the most important details.

The continental writers state that the temperature may be considerable for several days, rising as high as 104° F. in some cases, but in our patients this high pyrexia did not occur, and two remained afebrile throughout, although the rash was well marked. In any case the reaction is over by the third to fifth day, and it has been noticed that the earlier it is evoked in the course of treatment, the more severe is the rash, and the longer the duration of the temperature (Leichtentritt, Lengsfeld, and Silberberg).[1] Just before the onset of the fever the choreic manifestations seem to be aggravated, but with the disappearance of the rash they improve with dramatic suddenness, and are generally completely arrested within a week or ten days. In certain cases the reaction is delayed until the 24th day, and in others a curious secondary reaction may arise, similar to the primary one, 17 to 39 days after starting treatment (Leichtentritt et al)[1]. This occurs as long as 12 days after the drug has been stopped, and may occasionally be very severe (Keller).[2] Heart lesions, present at the time, are apparently unaffected and certainly not made worse, but in the German reports, details of the cardiac condition in the cases treated are meagre. In one of our cases the chorea was complicated by early carditis with dilatation. We had the impression that this was favourably influenced, and the heart had certainly resumed its normal size with the arrest of the chorea, although an apical systolic murmur persisted. The treatment has not been long enough in practice for us to form any opinion as to the ultimate prognosis. One or two cases have been described in which a relapse occurred many months after the first successful nirvanol treatment. In these children, nirvanol arrested the chorea again without producing the typical reaction on the second occasion (Keller,[2] Huber).[3] A few successful cures have also been reported in cases treated for the first time, which have shown little or no reaction (Schmal).[4] But in both instances the effect of the drug on the blood-picture is generally well marked despite the absence of rash or fever.

The most constant change in the blood is a true eosinophilia, which reaches its maximum just before the appearance of the rash. In addition, during the administration of the drug there is generally a leucopenia with a decrease of the polymorphonuclear cells and, at the same time, a relative lymphocytosis and monocytosis. With the subsidence of the general reaction the blood-picture gradually resumes the normal. These changes were mostly present in five out of our six cases, and have been tabulated on the accompanying charts. Eosinophilia appears to be one of the prominent features of nirvanol disease and, as already indicated, may occasionally be the only evidence of a reaction.

For the treatment to be successful one must aim at producing nirvanol disease, and with this in view a sufficiently large dose of the drug must be given, but there is as yet no means of regulating the severity of the reaction. It is wise never to exceed a daily dose of 0·3 g. of nirvanol. The drug must be stopped immediately the typical reaction (rash, fever, and so

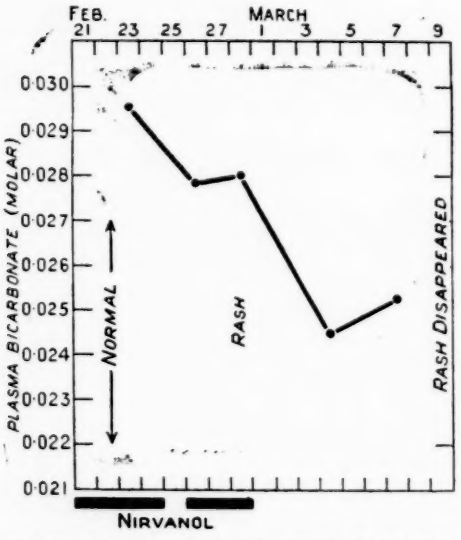
forth) appears, and if this has not occurred by the fourteenth day it is useless and even dangerous to proceed with the treatment (Huber).[3]

Pathology.

de Rudder[5] likens the reaction of nirvanol to that of serum disease, in which an alteration of the acid-base equilibrium of the blood has been found. He states that there is at first an alkalosis approaching a pro-anaphylactic tetany. The peripheral nerves share in the general stimulation, and this no doubt accounts for the temporary aggravation of the choreic movements. At the moment of the eruption the alkalosis is changed into an acidosis, and it is this sudden alteration presumably, which he claims, has such a marked effect on the central nervous system. Dr. W.W. Payne has investigated this point on two of our cases (Cases 3 and 4), and by measuring the blood plasma bicarbonate has been able definitely to confirm a tendency towards alkalosis during the administration of the drug, but was unable to establish any sudden swing over to acidosis. His estimations are tabulated in the Figs. 1 and 2. It will be noticed that, taking Blackfan and Bengt Hamilton's[6] figures, 0·022 to 0·027 molar as the normal, the plasma bicarbonate in Cases 3 and 4 was increased after a few days administration of the drug, but it never dropped below normal during the course of treatment. Thus there appears to be a tendency towards alkalosis, but not to an acidosis.

The usual effect of nirvanol appears to be absent in certain patients, and it is interesting to note that they are also resistant to the various sera, which in normal people would produce anaphylactic phenomena. This may possibly be taken as substantiating evidence that nirvanol disease and serum sickness are analogous. The exact manner in which the drug produces such a remarkable effect on chorea is not really known. It is certainly not due to a mere production of fever as, for instance, occurs in the malaria treatment of dementia paralytica, for the drug is just as efficacious when there has been no rise in temperature (see Cases 5 and 6). The eosinophilia can only be an integral part of the reaction, and seems hardly likely by itself to be the effective agent. If it were, other substances provoking eosinophilia might presumably have a beneficial action on chorea similar to nirvanol. We can hardly believe the explanation is that of protein shock.

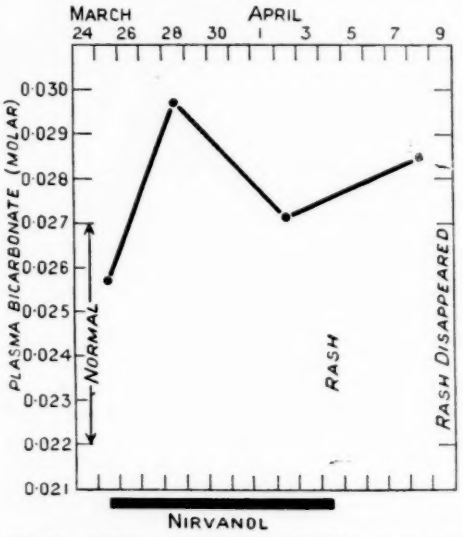
FIG. 1.



The blood-plasma bicarbonate estimation in Case 3.

Extensive animal experiments have been performed by Leichtentritt, Lengsfeld and Silberberg.[1] They produced shock in rabbits by injecting them intravenously with serum of patients previously treated with nirvanol, but there was no eosinophilia. Oral administration of the drug to these animals caused a marked leucopenia with relative lymphocytosis. When this was continued long enough the bone-marrow became seriously affected and an aleukæmia was produced, closely resembling that occurring in benzol or salvarsan poisoning, and after an excessive use of X rays and radium.

FIG. 2.



The blood-plasma bicarbonate estimation in Case 4.

Dangers.

Although the six cases we have treated ran a mild and favourable course, these experimental results serve as a warning that nirvanol is not a harmless drug, and that its exhibition, if not closely watched, is liable to be dangerous. It should never be given unless the doctor in charge is conversant with its action, and the patient must be under constant medical supervision. The possibility of a deleterious effect on the bone marrow must be kept in mind in the present stage of our knowledge of this treatment, and a watch kept on the leucocyte fall. Even with the most careful administration, alarming results have been reported on rare occasions. For example, Keller describes the following case. After a typical reaction occurring on the sixth day of nirvanol treatment, followed by a striking arrest of the choreic movements, the drug was stopped immediately and the patient appeared to be cured. Eleven days later, however, a severe secondary reaction set in with high fever, headache, and a second scarlatiniform rash, tonsillitis, gingivitis, stomatitis, nephritis, enlargement of the liver and spleen with jaundice, blood-stained diarrhœa, swelling of the face and œdematous ulceration of the upper lip. A protracted recovery eventually ensued, and was complicated by troublesome furunculosis. There was some reason to believe that the formidable secondary reaction in this case was brought on by accidental exposure to sunlight. This may have been a coincidence, but since another severe secondary reaction has been reported after giving artificial sunlight to a patient who had just finished his course of nirvanol, it appears wise to guard against such rays for two or three weeks after this form of therapy.

The rash may very occasionally extend to the bronchial mucous membrane as in measles, and give rise to broncho-pneumonia (Pilz).[7]

Results.

Good reports of nirvanol have come from various German clinics. Roeder[8] in Gottingen, Rietschel,[9] and Hester[10] in Wurzburg, Husler[11] in Munich, Matzdorff[12] in Breslau, Huber[3] and Schmal[4] in Berlin, Keller[5] in Karlsruhe, all subscribe to the effectiveness of the drug. Two other independent observers, however, Bendix[13] and Buttner, are not so enthusiastic, and find no advantage in nirvanol over any other form of treatment of chorea.

Judging from the following cases treated by this method, we have been impressed by the beneficial effect of the drug on chorea, and the disappearance of the movements has certainly seemed to us to be more rapid and complete with this form of treatment than with any we have employed hitherto.

CASE 1.—A girl, aged 11, had been suffering for three weeks from severe acute chorea, which had probably been precipitated by overworking for a musical scholarship. She had suffered from pains in the limbs six months previously. March 28th, 1929: On admission, movements were incessant, and the child was very restless with speech affected; heart normal. April 3rd: Nirvanol started, 0·3 g. daily. 5th: Sore throat; restlessness increased. 6th: Slight headache; temperature 101·4°; tachycardia, 140. 7th: Temperature subsided; pulse-rate 100. 8th: Mild conjunctivitis; no change in chorea. 13th: Rash appeared first on both elbows; scattered papules on hands, wrists and soles of feet; nirvanol stopped. 15th: Rash more extensive and irritating. 16th: Rash still developing and confluent in certain areas. 17th: Rash fading; chorea improving. 29th: No chorea.

Blood Counts (Case 1).

Date in 1929	Leuc. per c.mm.	Pn. cells. per cent.	Lym. per cent.	L.Mn.cells. per cent.	Eos. per cent.
2/4	10,000	55	38	6	1
5/4	18,000	42·5	49	4·5	4
9/4	14,000	47·5	48	4	0·5
12/4	16,000	45	50	4	0·5
16/4	20,000	58	38	3	1
23/4	13,000	56	37	4·5	2·5

Leuc. = leucocytes. Pn. = polymorphonuclear. Lym. = lymphocytes. L.Mn. = large mononuclear. Eos. = eosinophiles.

CASE 2.—A boy, aged 10 years, had been suffering from mild but persistent chorea for three months, which had not improved under treatment at home. There was no previous history of rheumatism. Feb. 19th, 1929: On admission, mild chorea present; heart showed some enlargement to the left with systolic murmur at the apex; normal temperature. 19th to 28th: Rest in bed without drugs produced no improvement. March 1st: Nirvanol started, 0·3 g. daily. 6th: Slight puffiness of the eyelids; heart resumed a normal size, but systolic murmur persisted. 9th: Temperature 99·6°; no alteration in pulse-rate. 10th: Rash appeared, morbilliform in character; face flushed, macular rash all over the body, conjunctivitis, infected fauces and a few small white spots on the buccal mucosa; axillary glands palpable; sore throat, but no other symptoms; temperature 99·4°; nirvanol stopped. 11th: Temperature subsided. 12th: Rash faded; movements less. 21st: No chorea.

Blood Counts (Case 2).

Date in 1929.	Leuc. per c.mm.	Pn. cells. per cent.	Lym. per cent.	L.Mn. cells per cent.	Eos. per cent.
28/2	12,000	38	52	3·5	6·5
5/3	9,000	37	49	5	9
6/3	8,000	50	37	4	9
10/3	6,000	23	62	3	12
5/4	10,000	49	49	2·5	8·5

Leuc. = leucocytes. Pn. = polymorphonuclear. Lym. = lymphocytes. L.Mn. = large mononuclear. Eos. = eosinophiles.

CASE 3.—A girl, aged 8½, had been suffering from chorea for three weeks. She had had repeated severe attacks of chorea during the last two years, associated with headaches and bouts of vomiting. No history of any other rheumatic manifestations.

Blood Counts (Case 3).

Date in 1929.	Leuc. per c.mm.	Pn. cells. per cent.	Lym. per cent.	L.Mn. cells per cent.	Eos. per cent.
22/2	9,200	64	32	4	0
25/2	8,200	48	48	8	5
28/2	5,200	59	27	3	12

Leuc. = leucocytes. Pn. = polymorphonuclear. Lym. = lymphocytes. L.Mn. = large mononuclear. Eos. = eosinophiles.

Feb. 15th, 1929; On admission there was moderate chorea with considerable hypotonia which showed no improvement with rest in bed; heart normal. 21st: Nirvanol started; 0·25 g. daily. 25th: Temperature 100°; nirvanol omitted for 24 hours. 26th: Nirvanol recommenced, 0·25 g. daily; temperature normal. 28th: Morbilliform rash; nirvanol stopped. March 13th: No chorea.

CASE 4.—A boy, aged 10, had had three mastoid operations, and following the last one, chorea had developed two weeks before readmission to hospital. At the same time there was a history of pains in the limbs. Jan. 14th, 1929: On admission chorea was of moderate severity and movements were even present during sleep. No definite evidence of cardiac involvement. Treated with bromides and arsenic, but without improvement. 24th: Chorea still well marked. Feb. 12th: Movements not so evident. 25th: Relapse of chorea. March 4th: Bromides and arsenic stopped; tolysin treatment started. 11th: Chorea still present. 25th: Nirvanol started, 0·25 g. daily. April 1st: Temperature 99·8° for one day. 4th: Rash appeared first on the wrists, morbilliform in character; nirvanol stopped. 5th: Rash spreading. 9th: Rash disappeared; chorea absent. May 23rd: Report from convalescent home stating that there has been no return of symptoms.

Blood Counts (Case 4).

Date in 1929.	Leuc. per c.mm.	Pn. cells. per cent.	Lym. per cent.	Eos. per cent.
23/3	11,000	49	44	1
27/3	10,000	55	42	1
30/3	5,000	20	70	5
2/4	11,000	54	31	5
5/4	10,000	50	35	5
9/4	16,000	70	25	2

Leuc. = leucocytes. Pn. = polymorphonuclear. Lym. = lymphocytes. Eos. = eosinophiles.

CASE 5.—A girl, aged 12, had been suffering from chorea for two months. Five years previously she had had a similar attack lasting three months, which was treated in turn with chloretone, bromide and arsenic. The present attack dated from an influenzal infection, and was at first treated by rest in bed at home together with salicylates, but without improvement. Heart normal. April 25th, 1929: On admission to hospital the chorea was moderate, and affected the tongue and the right side of the body more than the left. May 4th: No improvement from rest in bed and aspirin; nirvanol 0·3 g. daily started. 5th: Slight drowsiness. 6th: Slight increase in chorea; drowsy. 7th to 11th: No change. 13th: Rash appeared, starting on the elbows and spreading thence to the chest, abdomen, soles of the feet and palms of the hands; a few spots on the mucous membrane of the lower lip; nirvanol stopped. 14th: Rash more clearly defined; a few papular spots and erythematous patches most marked on the elbows, fading easily on pressure; slight enlargement of the occipital glands. 16th: Rash fading; movements less. 21st: Rash has disappeared. 22nd: No chorea; there was no appreciable alteration in temperature throughout the treatment.

Blood Counts (Case 5).

Date in 1929.	Ery. per c.mm.	Leuc. per c.mm.	Pn. cells. per cent.	Lym. per cent.	L.Mn.cells. per cent.	Eos. per cent.
2/5	4,960,000	4,600	49	46	3	2
7/5	5,300,000	4,500	41	52	3	3·5
13/5	5,000,000	5,000	46	38·5	6·5	7·5
15/5	5,300,000	6,000	35·5	51	5	8·5
21/5	5,600,000	4,400	48	43·5	1·5	2·5

Ery. = erythrocytes. Leuc. = leucocytes. Pn. = polymorphonuclear. Lym. = lymphocytes. L.Mn. = large mononuclear. Eos. = eosinophiles.

CASE 6.—A girl, aged 12¼, had been suffering from chorea for five weeks with involvement of the speech. The onset of chorea was accompanied by joint pains which lasted for a few days. No previous history of chorea or other rheumatic manifestations.

Blood Counts (Case 6).

Date in 1929.	Ery. per c.mm.	Leuc. per c.mm.	Pn. cells. per cent.	Lym. per cent.	L.Mn.cells. per cent.	Eos. per cent.
4/5	4,520,000	4,000	48	40.3	10	1·6
8/5	—	5,000	44·8	42·4	7·2	1·6
12/5	6,000,000	4,800	50	43	6	1
15/5	5,500,000	6,500	45	45·5	6	3
17/5	5,300,000	4,800	48·5	45	4	0·5
21/5	5,500,000	7,300	59	36	3·5	1

Ery. = erythrocytes. Leuc. = leucocytes. Pn. = polymorphonuclear. Lym. = lymphocytes. L.Mn. = large mononuclear. Eos. = eosinophiles.

May 2nd, 1929: On admission there were well-marked movements affecting the face, body and limbs, the left arm being very hypotonic; speech was bad; heart normal. 4th: Nirvanol, 0·15 g. 5th: Nirvanol, 0·45 g.; slight headache. 6th: Nirvanol, 0·3 g., which was then repeated daily; drowsy at times; no change in chorea. 7th to 12th: No change. 13th: Rash appeared; macules on elbows, chest,

abdomen, forearms and palms of the hands; one red spot on mucous membrane of the lower lip; nirvanol stopped; no change in movements. 14th: Rash more marked, morbilliform in character over neck, face, and trunk; a few papules on dorsum of the feet. 16th: Rash fading; chorea improving. 18th: Rash has disappeared; great improvement of chorea during last three days; there was no appreciable alteration in temperature throughout the treatment.

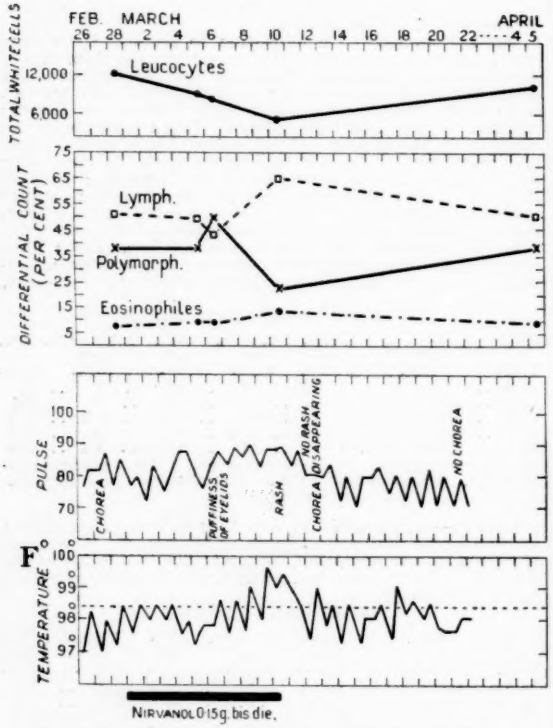
The effect of nirvanol on the blood was fairly constant in the first five cases, and followed pretty closely the changes referred to in the text. Cases 2 and 4 are such typical examples that they have been graphically represented (Figs. 3 and 4). There was no appreciable alteration in the blood count of the sixth case, and it is interesting to note that, unlike the others, this boy, although greatly improved, could not be counted completely cured.

Conclusion.

Other attempts have been made to treat chorea along similar lines. The method of Duzar in which adrenalin is injected intravenously, while at the same time alkalosis is produced by large doses of sodium bicarbonate by the mouth, has perhaps received the greatest attention, but it appears to be cumbersome and unreliable.

Judging from the many accounts from various independent sources, since Roeder's original communication in 1919, nirvanol certainly does seem to be a potent drug, which is effective in the treatment of chorea, and has the advantage of oral administration. Against this is the fact that there is a small element of risk in the treatment, and for this reason it may be considered unjustifiable to take such heroic measures to combat a self-curable disease. On the other hand it seems unwise to dismiss nirvanol summarily on this plea alone. We have all seen the severest cases of chorea recover with only the most trifling symptomatic treatment, but we have also seen these cases develop permanent heart disease before they are finally cured. It may be that the arrest of chorea before it has run its course may also prevent the rheumatic infection from reaching the heart. It is also possible that by treating a child with nirvanol during its first attack, relapses may be largely avoided. More prolonged investigations are necessary before these points can be decided. Should the ultimate prognosis of chorea after nirvanol prove more favourable than it is with our present modes of treatment, then the drug indeed would have been a valuable discovery. Finally, we might add that in two further cases, under our care, rheumatic nodules of long standing disappeared rapidly after a course of nirvanol.

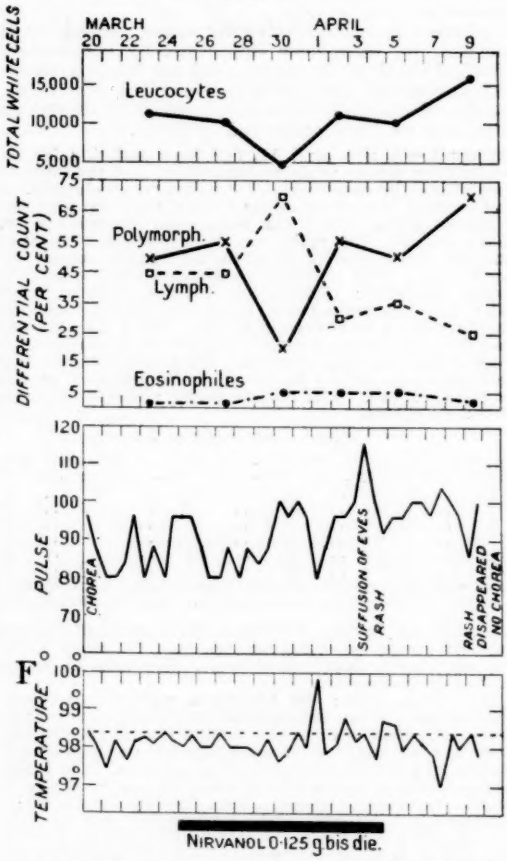
FIG. 3.



Blood counts, temperature, and pulse-charts of Case 2.

We are greatly indebted to Dr. P. O. Ellison, Dr. Alan Moncrieff, and Dr. G. W. Goodhart for the blood counts of our cases, and for the interest they have taken in this new form of treatment.

FIG. 4.



Blood counts, temperature, and pulse-charts of Case 4.

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ASTHMA AND HAY-FEVER.

By J. E. R. McDONAGH, F.R.C.S. Eng.

Asthma and hay-fever are mild forms of shock affecting the respiratory system, and their nature does not differ from that of shock occurring elsewhere in the body. Shock depends generally upon two factors: (1) a precipitation of colloid protein particles in the vessels of the organ involved, and (2) a loss to the organ of oxygenated blood. In the respiratory tract shock is caused by a precipitation of colloid protein particles in the lymphatic spaces and capillaries, and to a lesser extent in the narrowed arterioles and arteries. The particles become precipitated when they increase in size, absorb water, and undergo agglutination. This change is termed hydration, and is brought about by any agent which will lower their surface tension to a minimum, such as histamine, nicotine, urecoline, coniine, insulin, unprotected colloid, and aluminium or ferric hydroxide. The removal from the tissues of the corpuscular components of the blood causes an immediate reduction in the activity of the tissues. This results in a relaxation of the peribronchial muscular tissue, so that the bronchioles are not constricted. In opposition to current views, I maintain that constriction of the bronchioles does not occur in the most severe form of pulmonary shock, the important feature of the condition being the relaxation of the muscles. The vagus plays little or no part in the actual causation of asthma and hay-fever. Less severe hydration causes the corpusclar elements to collect in the branches of the pulmonary artery, where the cells and tissues are stimulated and deprived of oxygenated blood. The venous congestion attracts polymorphonuclear leucocytes, which break up the hydrated particles into smaller particles. This inflammation, though it relieves the condition of asthma, may lead to broncho-pneumonia or any kind of infection of the respiratory system. Palliative drugs disperse the symptoms by breaking up the protein particles into particles bearing an adequate negative charge. If an excessive number of the particles resulting from dispersion bear a diminished negative charge, thrombosis occurs, but usually most of the particles leave the colloid state to go into true solution. This change is termed dehydration, and the increased flow of blood in the vessels changes the dyspnœa to the inspiratory type.

The action of adrenalin on asthma is not to stimulate the sympathetic nervous system, but to disperse the hydrated particles, through its negatively charged aliphatic methyl group and its negatively charged phenolic hydroxyl group. It is harmful if used over a long period because of the interstitial changes which it brings about in the mesenchymatous tissue, which in the end cause hydration of the protein particles in the plasma as a cyclical change. Much better results, without these harmful effects, are obtained from strontium aspartate, calcium oleate, camphor, acetyl-choline, and choline, which are conductors; and oxygen, which is a dehydrator. Atropine, because of the large size of its nucleus, exerts an initial hydrator effect on the protein particles, and dehydration only occurs later by reason of its negatively charged active groups. It therefore aggravates certain cases of asthma. This property has escaped general recognition, doubtless because atropine is wrongly thought to have a direct action upon the vagus.

The Cause of the Attack.

Any hydrator may precipitate an attack of asthma and hay-fever, especially in persons whose protein particles have already been partly hydrated. The precipitating factor, the foreign protein, may increase the hypersensitiveness, but to remove it does not get rid of the primary cause of the hydration. This explains why cutaneous tests are valueless, and the removal of feathers and other sources of foreign protein from the surroundings only a palliative. An important hydrating factor is a combination of the sun's rays and muscular exercise; this is why hay-fever is most common in summer, and why asthma is so apt to occur in September. The prime cause of hydration is, however, inherited chronic intestinal intoxication, to which focal sepsis of all kinds is secondary. The initial hydration or state of hypersensitiveness is caused by the entrance into the blood stream of poisonous products of digestion. These are manufactured by mutation forms of the normal *Bacillus coli communis*, and consist of foodstuffs altered physically rather than chemically. The hydrated protein particles collect in the walls of the large intestine, to aggravate the condition first by stimulating and then by paralysing the nerve-endings of the vagus in Auerbach's plexus. This produces a hyper-activity, and later a hypo-activity, of the centre of the vagus in the brain, and finally of the cerebral cortex. Incoördination is produced, and intestinal stasis is aggravated, so that the result is a vicious circle. Hydration can be transmitted by both parents, and asthma and hay-fever are therefore symptoms of hereditary disease.

Treatment.

Asthma and hay-fever cannot be cured until inherited disease is eliminated. The treatment resolves itself into removing, as far as possible, the chronic intestinal intoxication, in coördinating the individual, and in correcting the abnormal chemico-physical state of the protein particles.

Removal of the chronic intestinal intoxication is best achieved by washing out the colon as far back as the ileocæcal valve by the syphon method, by having the bowels opened two or three times a day ever afterwards, by avoiding animal food as far as possible, and in particular butcher's meat, eggs, and milk in large quantities, and by immunising the patient against the pathogenic micro-organisms found in the excreta. While the ascending colon and cæcum are being washed out, drugs may be incorporated in the fluid, as absorption readily takes place through this part of the large intestine. The best aperients to use are taxol, and some preparation of liquid paraffin. The manner in which the food is cooked forms 50 per cent. of the problem of diet.

The actual treatment of an attack of asthma depends in the main upon whether the attacks recur at long or short intervals and upon whether they are taken at their inception or later. Patients who have continuous asthma and signs of interstitial pneumonia do best with iodine, thyroid, and ichthyol or thiol-amino-methyl-glyoxaline, prescribed internally, and with small and repeated doses of the carbon di-sulphide product of di-ethyl-amine (contramine) injected intramuscularly. Patients who get an attack now and again should receive two intramuscular injections either of sup. 36 (0·01 g.) or of B.N. 368 (benzoyl-para-amino-benzoyl-3-6-8-hydroxy-naphthylamine: 0·005–0·01 g.), on two successive days. This is the best treatment in cases of hay-fever, because both asthma and hay-fever are most frequently occasioned by the hydration undergone by certain protein particles in the plasma through the dehydration of other protein particles. Both the compounds function as conductors; they correct the dehydration and cause dispersion of the recently hydrated protein particles. Provided an attack of asthma is treated at its inception and a case of hay-fever at the beginning of the season, the attack may be cut short and the next warded off for months, in some cases for years, while hay fever can be checked for the season and one or more ensuing seasons. I have had several cases each of asthma and hay-fever where the timely use of sup. 36 or B.N. 368 checked the attack instantaneously and prevented its recurrence, while the treatment of the primary cause was being carried out. When the hydration is well advanced pure conductors are useless for causing dispersion, and only simple dehydrators and conductors with a dehydrator action can be employed. Dehydrators need to be used

with caution, because the ultimate result of using too large or too many injections is itself hydration, the state responsible for the attack. Therefore I use dehydrators having the minimum hydrator effect and those which possess a conductor action as well. Choline and acetyl-choline are useful at first, but they usually fail when re-employed. Strontium aspartate in 0·01 g. doses, injected intramuscularly every day or every other day, is a most useful drug in the less severe attacks, and is to be preferred to adrenalin. In some of the more severe cases, even when combined with oxygen subcutaneously, the drug may fail to cause dispersion of the hydrated particles. In some cases no known drug is able to correct the abnormal chemico-physical changes, and the attack has to run its course until the hydrated protein particles undergo the cyclical change of dispersion. Peptone, advocated by Auld,[3] [4] acts by causing dispersion of the hydrated protein particles and, being a derivative of protein, its action is essentially homœopathic. It must be used with caution, because a reaction (hydration) causes a serious aggravation of the trouble. Peptone does not cure asthma and hay-fever and, although its initial use may check an attack, it often fails to act a second time. Heroin is the most efficacious hypnotic in asthma, because the two acetyl groups cause dispersion of the hydrated protein particles. The greatest caution is necessary, because of all the condensed nuclei of benzene its vehicle phenanthrene is the one which causes the maximum degree of protein hydration. These methods have proved successful in a large number of cases, the end-result varying chiefly with the stage to which the chronic hydration had progressed and with the condition of the patient.

Illustrative Cases.

CASE 1.—A boy, aged 7, had had asthma every night for six months. The attacks were aggravated by active exercise. The mother and father had been operated upon for appendicitis and the mother's brother is Case 4. The patient had cyclical vomiting as an infant, hay-fever every year, and nocturnal enuresis occasionally. The teeth were bad and the hands were covered with warts. The urine gave an intense reaction with the hydrochloride of di-methyl-para-amino-benzaldehyde. Blood examination was as follows:—

Suspension stability of the red blood corpuscles	0·1 c.cm.
Refractive index of the serum	1·3473
Percentage of blood-sugar	0·137 g.
Percentage of blood-urea	16 mg.

Ultra-microscopic picture: Many particles moving with many large and refractile giant particles, ringed particles, and giant particled clumps precipitated.

Bacteriological examination of the excreta: 10 per cent. atypical *Bacillus proteus hydrophilus.*

Treatment.—Patient was dieted, made to have the bowels open two to three times a day, was given a course of treacle enemas till colon was clear, and had injections of the fæcal vaccine in doses of 125,000. The patient recovered completely; two injections of sup. 36 (0·005 g.) stopped the asthma at once.

CASE 2.—A girl, aged 9, had suffered from asthma since birth. Maternal grandfather and grandmother died of cancer; father suffered from hay-fever and his mother and brother were chronic asthmatics. Patient had one brother and two sisters; the brother suffered from asthma and the sisters from urticaria and epilepsy respectively. Blood examination was as follows:—

Suspension stability of the red blood corpuscles	0·7 c.cm.
Refractive index of the serum	1·3489
Percentage of blood-sugar	0·112 g.
Percentage of blood-urea	41 mg.

Ultra-microscopic picture: Many particles moving with a fair number of giant particles, all of which had a halo around and were very refractile. The other particles moved very actively around the giant particles. There were some clumps and agglutinations precipitated.

Bacteriological examination of the excreta: 20 per cent. *Bacillus fæcalis alkaligenes.*

Treatment.—Patient was dieted, made to have the bowels open two to three times a day, was given a course of treacle enemas till colon was clean, and had injections of the fæcal vaccine in doses of 250,000. The patient recovered completely.

CASE 3.—A woman, aged 28, who used to suffer from asthma and chronic bronchitis as a child, sought advice for constant abdominal pain. The patient had had attacks of rheumatic fever and was supposed to have had typhoid fever and paratyphoid. She had suffered from seborrhœa and acne vulgaris, and had once been jaundiced. The patient was always depressed; she suffered severely from dysmenorrhœa, and was in every way a typical example of familial chronic intestinal intoxication. Blood examination was as follows:—

Suspension stability of the red blood corpuscles	0·3 c.cm.
Refractive index of the serum	1·3502
Percentage of blood-sugar	0·118 g.
Percentage of blood-urea	18 mg.

Ultra-microscopic picture: Fair number of particles moving, with some very refractile giant particles and ringed particles. There were many giant particles, clumps, and agglutinations precipitated, with some precipitated en masse.

Bacteriological examination of the excreta: 60 per cent. Morgan bacillus.

Treatment.—Patient was treated in the routine way and recovered completely. This case shows that in spite of the asthma and bronchitis disappearing other signs and symptoms, the result of protein hydration, presented themselves.

CASE 4.—A man, aged 33, had had asthma for 14 years; eating eggs and having anything to do with rabbits brought on an attack immediately and the smell of petrol frequently precipitated an attack. The patient was the uncle of Case 1. The patient suffered from chronic bronchitis as a child, had had two attacks of rheumatic fever, and had been afflicted with acne vulgaris for many years. The optic discs were mal-developed, the ears were prominent, the elbows were wide-angled and hyperextended, and the patient could not stand with his feet and knees together. All the molars had been stopped or removed; the tongue was furred and the patient had acro-asphyxia. The pulse was 80 and the blood pressures registered 105 and 70 mm. Hg respectively. An examination of the abdomen revealed tenderness in both hypochondria and both iliac fossæ. The urine gave an intense reaction with the hydrochloride of di-methyl-para-amino-benzaldehyde. Blood examination was as follows:—

Suspension stability of the red blood corpuscles	1·2 c.cm.
Refractive index of the serum	1·3487
Percentage of blood-sugar	0·062 g.
Percentage of blood-urea	39 mg.

Ultra-microscopic picture: Few particles moving with some giant particles and ringed particles. There were more particles precipitated as giant particles, ringed particles, and clumps. The precipitation amounted almost to precipitation en masse.

Bacteriological examination of the excreta: 20 per cent. *Bacillus proteus valerici.*

Treatment.—Butcher's meat, eggs, and milk were excluded from the diet; the colon was washed out; the attack which the patient had at the time of examination was checked with two injections of B.N. 368 (0·005 g.), and later four injections of the fæcal vaccine were prescribed in two courses of two in a half and one million respectively. The patient had had a course of peptone injections without benefit. He recovered completely and was able to resume his occupation as a motor mechanic.

Summary.

Asthma and hay-fever are symptoms of inherited disease caused by the precipitation of hydrated protein particles and by the lack of oxygenated blood in the respiratory tract. The chief signs and symptoms of inherited disease are mal-coördination and a chronic intestinal intoxication. Asthma and hay-fever can usually be prevented by correcting the mal-coördination and removing the chronic intestinal intoxication.

Asthma and hay-fever are not diseases. Asthma is not caused by a stimulation of the vagus occasioning a constriction of the bronchioles. When adrenalin palliates an attack it does so by causing the hydrated protein particles to disperse, not by stimulating the sympathetic nervous system.

Asthma and hay-fever can usually be overcome with drugs able to cause dispersion of the hydrated protein particles. These measures are really no more than palliative, and a "cure" can result only in the prevention of inherited disease.

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ANTIDYSENTERY BACTERIOPHAGE IN THE TREATMENT OF BACILLARY DYSENTERY.

A RECORD OF SIXTY-SIX CASES TREATED, WITH INFERENCES.

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DYSENTERY is one of the three most fatal infectious diseases of the urban population of Egypt. The official figures for Alexandria for 1927 and 1928 show on a mean population of 579,485 a death-rate from tuberculosis of 1, from diphtheria of 0·3, and from dysentery of 0·2 per thousand; but for the five years 1924–28, in an average population of 560,218, the total deaths registered from these three diseases were: tuberculosis 3532, dysentery 844, and diphtheria 572. This gives over the longer period a mean yearly dysentery death-rate of 0·3 per thousand. Of these deaths the majority must be put down to bacillary dysentery; first, because, judging by the laboratory diagnosis of specimens, this is far the more prevalent form of the disease,* and secondly because more specific and satisfactory therapeutic measures (emetine, yatren) have hitherto been available for the treatment of amœbic cases.

When I took up my duties in Alexandria in 1926 I found that the serum treatment of bacillary dysentery had largely fallen into disuse as inefficacious and that many cases of bacillary dysentery were, in my opinion, being erroneously diagnosed and treated as amœbic. This meant that before 1927 many, perhaps most, bacillary dysentery cases in the district, received no specific treatment whatever. Can the impressive fall in death-rate for the years 1927 and 1928 be accounted for by the institution of a relative amount of specific treatment, or must it be passed over as something incalculable, although it represents an economy of close upon 100 lives per year? I believe that it is related to the use during those two years of antidysentery bacteriophage for the treatment of a certain proportion of the bacillary dysentery cases in the district. Towards the middle of 1927 I began preparing and distributing gratuitously antidysentery bacteriophage for therapeutic use to doctors in the city who were willing to coöperate in an endeavour to obtain information on the value of this treatment. The distribution was limited to cases which had been diagnosed cytologically in these laboratories as bacillary dysentery. Opinion then was, and to a large extent still is, divided as to the therapeutic merits of bacteriophage.

d'Herelle (1926[1]), guided by the bacteriolytic property of bacteriophage which he had established in vitro, inaugurated this treatment in 1921 on five cases of Shiga dysentery. The results were excellent: the bloody stools ceased within 24 hours in each case and the patients entered upon immediate convalescence. Enthusiasm, however, shortly afterwards waned. Otto and Munter (1921) in Germany, Davidson (1922) in America, and Fletcher and Kanagarayer (1928) in the Malay States recorded essentially negative results. Against this Da Costa Cruz (1924) in Rio de Janeiro, after an initial series of poor results, finally established uniform success, and thereby confirmed d'Herelle's original observations. This was the situation when the present investigation was begun and throughout its progress.

Phage Employed: Its Preparation and Distribution.

The therapeutic phage distributed was of multiple origin and polyvalent quality. It consisted initially of four phage-strains: one passed to me by d'Herelle and three others isolated by me in Egypt. The mixture was put up against 16-hour broth-cultures of some 12 *local* strains of dysentery bacilli: two Shiga, three Flexner, six Hiss (including one Sonne), and one Gay. Hiss type constitute the predominating organism in the Alexandria region. Complete lysis of the cultures occurred after a few hours in the incubator at 37° C. After 24 hours' incubation the lysates were mixed and filtered through a filter impregnated with infusorial earth, and later through a L3 Chamberland filter. The filtrate constituted the therapeutic phage. It was transferred to sterile ampoules in quantities of approximately 2 c.cm. Three ampoules were, as a rule, distributed to each patient undergoing treatment, with a circular instructing the patient on the use of the phage and a questionaire to the doctor, to be filled up and returned to the laboratory later. Nearly 200 cases received treatment, about 50 in 1927 and 150 in 1928, and circulars were returned from 92 cases. Of these, only 66 were full enough to use.

The remaining cases from whom no returns were received have, I consider, to be reckoned for the most part as "cures," since had they been "failures" they would have reported again at the consulting-rooms of their medical attendants. As they were mostly poor and left no addresses, they could not be satisfactorily followed up. But providing them with phage probably meant to a certain extent the dissemination of antidysentery phage in their surroundings, a factor to which d'Herelle has attached some importance, since he holds that "immunity by phage, like the disease itself, is infectious."

Clinical Results.

For simplicity of interpretation and ease of reference, the results arrived at are classified in a general way, as follows:—

+ + + = Very good = Stools reduced to 2–3 per day by the 2nd day (counting the initial day as 0), in conjunction with improvement in the general condition of the patient.

+ + = Good = (Stools reduced to 3–4 per day by the 3rd day, or Stools reduced to 3 per day by the 4th day) with improved general condition.

+ = Moderately good = Stools reduced to 4–5 per day by 5th day.

(+) = Partial failure = Little or no change in the number of stools or in the general condition within 4 days, but ultimate recovery.

— = Failure = Death, or no change within 1 week of commencing treatment.

When anti-serum treatment was first being tried two factors were mainly relied upon as criteria of cure: (1) lowering of mortality, and (2) diminution in the duration of the disease, compared with the recognised slowness of cure when drug treatment only was available. Thus, Kolle and Hetsch (1918) record that the nervous symptoms diminished, the patient's strength returned, the colic and tenesmus ceased, while blood and mucus gradually disappeared from the stools, which in 2–5 days regained their normal composition. In many cases, however, progress was not so rapid. Dopter and Saquepée (1921) observe that the number of stools became lowered to 8–10 in 24 hours, to remain stationary at this level for many days. All authors have noted that when serum-therapy was instituted late it seemed to have no effect. This applies to a certain extent also to phage-therapy, as a badly eroded intestine naturally cannot return all of a sudden to its status quo ante.

The result of phage was "very good" in 35 of our 66 cases, "good" in 10, "moderately good" in 6, a "partial failure" in 5, and a "failure" in 10. Two cases, however, had been ill a fortnight and were practically dying at the moment of the phage intervention. This was presumably true also in a third fatal case in which the date of onset was unknown. One patient was ill about two months before the phage was given, and naturally an immediate cure was out of the question, in view of the intestinal lesions present. Eliminating these four cases, the failures are reduced to six. On

* Our statistics indicate that 80–90 per cent. of all dysenteries in Alexandria are bacillary. The records of the Public Health Laboratories, Cairo, indicate a similar state of affairs. (See Perry and Benstead, 1928.)

the severest possible analysis, grouping these 6 "failures," the 5 "partial failures," and the 6 "moderately good" results together as failures, we have in all 17 failures and 45 successes on a total of 62 cases. This represents a minimum percentage success for the treatment of 72·6. Of the failures, three had been ill for a week—maybe more—before the phage treatment was begun; two of them were children less than one year old. Both early intervention and the age of the patient play an important rôle in the success of the treatment.

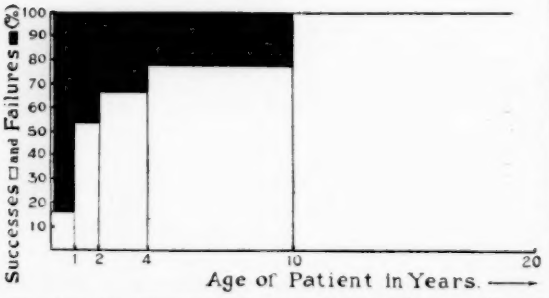
In five cases anti-serum treatment was employed in addition—an unintentional experiment, since it was no part of my idea that serum should be used—it was administered independently by the treating physician. Three of these figure as failures and two as successes. Of the three failures, one had the serum before and two after the phage, while the two successes had the anti-serum before the phage. If any conclusion is justified by these cases it is, I think, that there is no contra-indication to phage when the patient has already had serum. The two successes are interpreted rightly or wrongly, as solely due to the phage. This interpretation is, I think, justified by the clinical notes. Moreover, all authorities are agreed that for antidysentery serum to be of any use it must be given in large doses, and not in the 10 c.cm. doses generally used here.

It is well known that certain cases of bacillary dysentery do well on saline treatment alone, or even on emetine, but this does not invalidate the successes attributed to phage, because it is a well-established fact that many patients develop phage spontaneously. One case is particularly interesting.

A specimen of fæces, collected on the fourth day of illness, just before the administration of the first dose of therapeutic phage, was found to be rich in a phage with the following activities: Shiga +++, Flexner ++, Hiss +++, Paracolon No. 2+++. Yet clinical improvement only dated from the administration of the therapeutic phage. The particular therapeutic phage used in this case possessed activities which were slightly different—i.e., Shiga+++, Flexner+++, Hiss++, Paracolon No. 2−.

This is obviously a patient who would eventually have recovered of his own accord. The therapeutic phage by mouth merely accelerated the cure and constituted the "reinforcements" necessary to ensure a rapid phage "victory" in the phage-bacterial engagement already going on in the patient's intestines. From this and other considerations I have not the slightest doubt that the spontaneous development of phage will explain most of the bacillary dysentery "cures" due to emetine and simple saline treatment.

FIG. 1.



Showing the percentage of successes and failures, under the influence of phage treatment in 62 cases of various age-periods.

Causes of Failure of Phage Therapy.

Three factors exert an influence on the success or failure of the treatment: the age of the patient, the number of days' illness before the phage intervention, and the bacterial flora. The 62 cases arrange themselves in terms of success and failure as set out in Table I.

These numbers are represented diagrammatically in Fig. 1.

TABLE I.

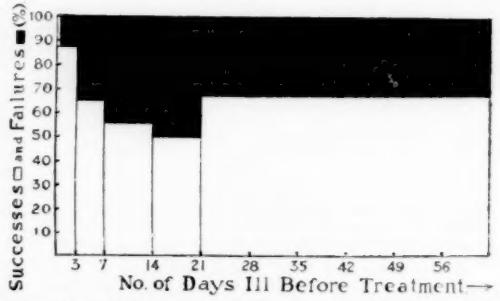
Age.	Number of cases.	Percentage.	
		Successes.	Failures.
Under 1 year	6	16·7	83·3
Between 1 and 2 years ..	15	53·3	46·7
„ 2 and 4 „ ..	9	66·7	33·3
„ 4 and 10 „ ..	9	77·8	22·2
From 10 years upwards ..	23	100·0	0

The phage treatment was least successful with children under 1 year old. It was three times as successful with children between 1 and 2, four times better with children between 2 and 4, and still more successful with children between 4 and 10, to reach complete success with adults.

Table II. sets out the arrangement in time-periods of the 62 cases in which definite information was obtained of the number of days of illness before phage treatment.

These numbers, represented diagrammatically, give Fig. 2.

FIG. 2.



Showing the percentage of successes and failures of phage-therapy in dysentery, in terms of the number of days patient was ill before the intervention with phage.

TABLE II.

Days ill.	Cases.	Percentage.	
		Successes.	Failures.
1–3 ..	15·5	87·1	12·9
3–7 ..	27	64·8	35·2
7–14 ..	13·5	55·5	44·4
14–21 ..	3	50	50
21–60 ..	3	66·7	33·3

The success of treatment varies inversely as the number of days the patient was ill before it was commenced. Thus, if the patient had been ill for three days or less about 90 per cent. success was obtained, while when treatment was delayed until the fourth to seventh day the success was about 65 per cent. When treatment was commenced one to two weeks after onset, a success of 55 per cent. only was reached; when it was delayed for three weeks, a fifty-fifty result was obtained. Beyond three weeks, and up to two months, the diagram records a certain improvement in the percentage of successes. The need for early intervention therefore is established. It might be better not to wait for a preliminary purging but to administer the phage at once and to give salines afterwards. There is one instructive case in the series which was treated very successfully in this way.

If the microbes causing the intestinal lesions are not attacked by the phage, obviously no good can be expected from its administration. Cultural studies were made of the majority of the cases, but only in six was the flora completely determined before and after phage administration. Two were

successful phage-therapy cases, two were immediate failures, and two were complete failures. They are summarised in Table III.

TABLE III.—*Bacterial Flora Before and After Phage in Six Cases.*

Case.	Age in years.	Days ill before phage administered.	Bacterial flora (as isolated on Endo's medium). Before treatment.	After treatment.	Result of treatment.
2	8/12	7	Coliform only.	Two atypical *B. dys.* (Gay) types.	—
25	2½	4	*B. proteus* No. 2.	*B. proteus* No. 2, *B. proteus* No. 3, *B. paracolon* No. 1, and a *B. meta-dys.* (unknown).	—
27	3	3 (1)*	*B. proteus* No. 2.	*B.C.L.A.* No. 2 or 5, *B. lactis aerogenes.*	+
33	4	1	*B. dys.* (Sonne) *B. paracolon* No. 1.	*B. lactis aerogenes*, and an unknown bacillus of the dysentery group (*a*).	+ + +
35	5	3 (1)*	*B. proteus* No. 2.	*B. morgani* No. 1, *B. lactis aerogenes*, an atypical *B. dys.* (Gay), and a *B. meta-dys.* (unknown).	+
40	6	2	*B. dys.* (Hiss)	Coliform only.	+ + +

* Third day ill, but first day of "blood and mucus" in stools. The cases were sister and brother respectively.
(*a*) Fermenting glucose, maltose, and saccharose, but not mannite or dulcite.

The two cases (Nos. 33 and 40) which did well on phage-therapy had classical *B. dysenteriæ* (Sonne and Hiss respectively) present in the stools before the administration of phage, while, after phage administration, these organisms could not be recovered on culture from the stools: in the one case 36 hours after commencing the treatment, and in the other on the fourth day. *B. proteus* No. 2 is practically constant in the failure cases. This is very striking. Its absence, before and after, in the successful cases is equally noteworthy. It suggests, I think, the need for the revision of our ideas concerning the rôle of *proteus* organisms in the summer diarrhœas of children and the bacillary dysenteries of adults. Most authors consider them rather as concomitants. I suggest that the presence of *proteus* organisms, more especially *B. proteus* No. 2, constitutes an ætiological factor of considerable importance in bacillary dysentery, particularly in children. This organism only differs from *B. morgani* No. 1, so frequently found in summer diarrhœa, by liquefaction of gelatin and by failure to produce indol. It is, I think, chiefly because of its presence that the results of phage-therapy were so disappointing in the cases under two years old. To combat *proteus* organisms by phage-therapy is fraught with difficulty, because the *proteus* group of bacteria is not homogeneous, as is the dysentery group, in its susceptibility to phage action; and because *proteus* organisms are rich in specific endotoxins, allied to botulinus toxin though less powerful. There is, therefore, no guarantee that a phage active against a *B. proteus* causing trouble in one intestinal tract will be active against the *B. proteus* of another case. Moreover, lysis in vitro of the bacterial bodies of *proteus* organisms, by liberating their contained toxins which pass into the filtrate, may render such a liquid too toxic for immediate therapeutic use.

d'Herelle (1926[2]) records having isolated two races of bacteriophage which, at the moment of their isolation from the stools of two infants who had died of infantile cholera, were very virulent for *B. proteus vulgaris*, yet of 12 strains of *B. proteus* only three were found susceptible, and they were the same for each of the two races. Again, he found the filtrate from a bacteriophaged suspension of *B. proteus vulgaris* was extremely toxic for rabbits immediately after the dissolution of the bacilli (0·5 c.cm. subcutaneously causing death within a few hours). When kept, however, for 10 days the toxicity had diminished, the rabbit then surviving the intravenous injection of 2 c.cm.

Summary.

The general result of phage treatment for bacillary dysentery appears very much in its favour: 70 per cent. of the cases showed a well-defined response and rapid improvement. The good effect was the more marked the earlier the treatment was begun; it was relatively less favourable the younger the patient. It was particularly successful in patients aged 10 years and upwards. Cases with *proteus* group organisms—especially *B. proteus* No. 2—in the intestinal flora did not do so well.

Incidentally, during the progress of the treatment and side by side with it, a noteworthy lowering in death-rates from dysentery was recorded. Whether this is a simple coincidence, or affords evidence of a cause-and-effect relationship, it is not at present possible to affirm. During the investigation there undoubtedly occurred a certain dissemination of the living ultra-virus *Protobios bacteriophagus dysenteriæ* in the surroundings of the patients, with a probable dissemination of natural protection. Distribution of phage to patients in a region means an increased proportion of phage "carriers" among the population, with, in all probability, a correspondingly increased distribution of phage to food and drink. Here doubtless the fly—the great distributor of dysentery bacteria in nature—may reasonably be assumed to play a rôle.

My best thanks are due to the many colleagues—representatives of the Air Forces, the Army, and the civil practitioners in Alexandria, too numerous for individual mention—who kindly collaborated with me in this investigation.

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Clinical and Laboratory Notes.

A SIMPLIFICATION OF THE "HALO" METHOD OF MEASURING THE DIAMETER OF RED BLOOD CORPUSCLES.

BY D. MERLIN PRYCE, M.B. LOND.,
SECOND ASSISTANT PATHOLOGIST, ST. MARY'S HOSPITAL.

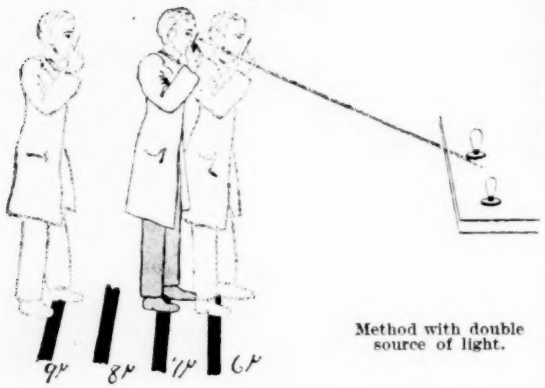
THIS optical method was introduced into hæmatology by Pijper [1 2] and, as the "diffraction method," has been brought by him to a high state of perfection. In his last paper,[2] in which the theory is fully discussed, a method is given by which the patient's blood can be examined at the same time as the normal. It has, however, been suggested in this journal[3] that, on account of the elaborate nature of the apparatus required, the general application of the method is somewhat limited. The purpose of the present communication is to describe two methods in which the necessary apparatus is reduced to a minimum.

First Method.

The observer looks through a blood-film at two electric lamps placed about two feet apart at right angles to the line of sight. Two "halos" are seen, each consisting of a number of concentric spectra. The apparent size of these two "halos" is dependent on the distance from the twin source of light. They appear to become smaller on stepping forwards, and to become larger on stepping backwards. In this way any pair of corresponding coloured rings in the two

"halos" can be made to meet, overlap, or separate. The distance at which contact is made between a selected pair of corresponding rings is directly proportional to the diameter of the red blood corpuscles. The coloured ring which is easiest to use is the red fringe of the innermost complete spectrum (Spectrum of first order).

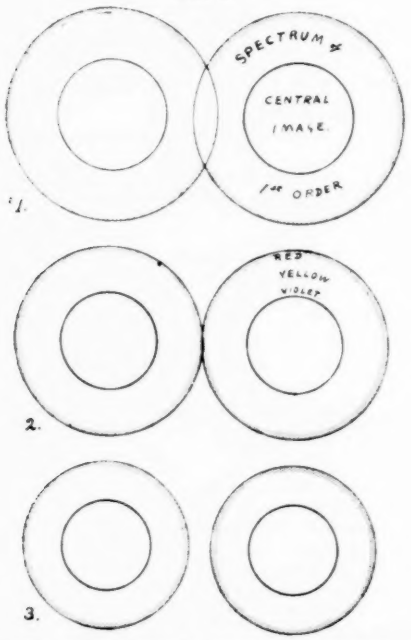
FIG. 1.



Method with double source of light.

The patient's blood-film is examined at the position of contact for the normal. Any difference in the size of the "halos" is shown by overlapping or separation of the selected diffraction rings (see Fig. 2). For example, in pernicious anæmia the "halos" are obviously smaller, and it is necessary to step back a distance

FIG. 2.



Twin spectra of (1) acholuric jaundice, (2) normal, and (3) pernicious anæmia blood-films at position of contact for the normal.

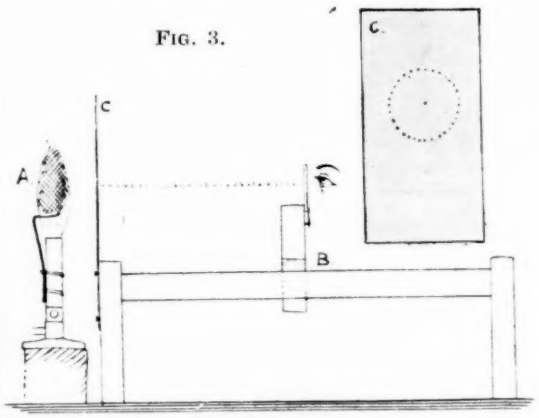
which is proportional to the increase in the size of the red corpuscles. If the method is adopted as a routine the floor may be calibrated with chalk lines, so that one foot corresponds to 1 μ. This is done by adjusting the distance between the lamps so that, with normal blood-films, apparent contact is made at a distance of 7 feet. They will then be about 2 feet 4 inches apart.

This method requires no special apparatus, is quite sufficient for diagnostic purposes, and could easily be used by the general practitioner in his ordinary consulting room.

Second Method.

This method, devised by Thomas Young (1773–1829) and described in text-books of physics under the heading of Young's eriometer,[4] is admirably suited to the present purpose. The apparatus required, which is easily constructed, consists of: (A) A source of light (sodium flame or electric lamp). (B) Optical bench with rider for carrying blood-film. (C) Metal plate with a central aperture 1–2 mm. in diameter, surrounded by a ring of 2 cm. radius, of pin-point holes. (The measurements are, of course, arbitrary.)

FIG. 3.



Young's eriometer.

A dark room is necessary when using sodium light, but is not essential for white light. On looking through the blood-film, diffraction rings are seen around the central aperture in C, whilst the ring of holes appears as a circle of luminous points. The film is moved about until apparent coincidence is obtained between the circle of luminous points and a selected diffraction ring (say the yellow of the spectrum of the first order). The distance of the film from the metal plate at which this takes place varies directly as the diameter of the red corpuscles. Since the diameter of the normal corpuscles is known, that of the patient's corpuscles can be calculated by simple proportion. With sodium light, concentric yellow rings are seen instead of spectra. Readings are taken for both borders of a selected ring (say the first). The difference and the mean correspond with the anisocytosis and average size respectively.

My thanks are due to Dr. Wilfrid Newcomb and Mr. Leslie Paton for their kind and valuable advice.

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A CASE OF
LOBAR PNEUMONIA IN A CHILD.

BY KENNETH MCFADYEAN, M.R.C.S. ENG.

THE following case seems to be worth recording because it illustrates some of the difficulties of diagnosing pneumonia in children:—

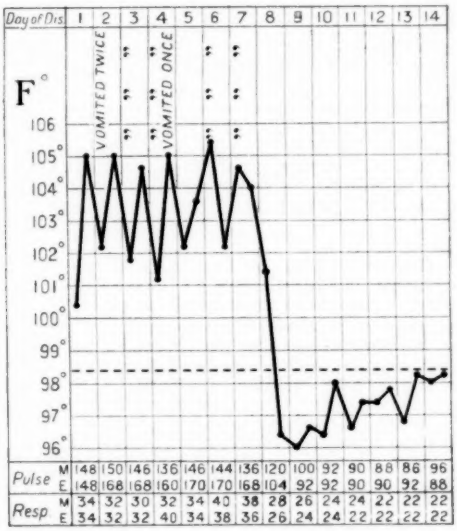
A girl, aged 5½ years, complained of earache on Dec. 5th. On the 6th, in the early afternoon, she said she felt cold, and was put to bed with a temperature of 100° F. She was first seen by me at 8 P.M. on that day, when a diagnosis of lobar pneumonia was made. There were definite alterations in the breath sounds and some crepitations over the lower left lobe, and a few fine crepitations scattered over a small

area inside the right scapula. The right tympanum was inflamed, but this was not considered serious. During the night of the 6th–7th there was a small quantity of blood and straw-coloured discharge from the right ear.

On Dec. 7th a consulting physician saw the child at 9 A.M., and was satisfied that there was nothing abnormal in the chest, but was of the opinion that there was mastoid inflammation. At noon an aural surgeon saw the case. In his opinion the mastoiditis was acute, and was the cause of the child's general condition. He advised surgical interference unless the general condition improved in 24 hours. At 9 P.M. a second consulting physician saw the child and was satisfied that his examination of the chest was negative. He advised surgical treatment of the aural condition. At 10 P.M. a second aural surgeon expressed the opinion that the mastoiditis was slight, and that the case should be watched.

On Dec. 8th the inflammation in the right ear was definitely subsiding. There was very little swelling in the meatal floor, the tympanum was pink, there was no aural discharge, and no perforation was seen. There was no longer tenderness over the mastoid. In the evening the patient complained of occasional severe stabbing pains in the chest over the lower left ribs in the axillary line.

On Dec. 9th a consulting pathologist found a leucocytosis of 22,400 per c.mm., with 77 per cent. polymorphonuclear leucocytes, and expressed the opinion that this "indicates the presence of pus under tension." All signs of inflammation in the ear had subsided. In the afternoon the patient's



condition seemed serious. The signs in the left lower lobe were now well marked. The first consultant, on re-examining the patient's chest, expressed the opinion that possibly the patient had a miliary tuberculosis. Albumin was present in the urine. Subsequent examination showed that the degree of albuminuria varied considerably, and was very severe when the temperature was between 105° and 106°, and at a time when the child was drinking considerable quantities of albumin water.

The treatment of the case as one of pneumonia was instituted at the outset and continued. On Dec. 13th the crisis set in, with definite signs over the left lower lobe. In 24 hours the temperature dropped from 104° to 96°, pulse from 170 to 108, respiration from 36 to 26. The patient made an uneventful recovery.

The case presents some striking features, of which one or more is frequently to be found in cases of infantile lobar pneumonia. These are, firstly, the liability of an error in diagnosis when an acute otitis media is present in the early stages; secondly, the difficulty of making a correct diagnosis when relying solely upon one examination of the chest, made at a particular moment during the illness; thirdly, the possibility of attaching undue weight to the presence of albuminuria in this condition; and lastly, the fallacy of regarding a high leucocytosis as necessarily indicative of pus. One other unusual feature, rarely seen, was the persistent vomiting.

All these features of the case are adequately dealt with by Dr. G. F. Still in his "Common Disorders and Diseases of Childhood."

London, S.E.

A CASE OF HYPERTHYROIDISM WITH MANIA.

RELIEVED BY OPERATION.

By J. Murray Black, M.B., F.R.C.S. Edin.,
HON. SURGEON TO THE DUNFERMLINE AND WEST FIFE HOSPITAL.

In his selection of cases for operation Mr. W. H. C. Romanis[1] holds that "in serious mental changes of the melancholic or maniacal type" operation is absolutely contra-indicated. The following case, however, suggests that maniacal symptoms can sometimes be relieved by operation.

Mrs. A. B., aged 42, whose husband was abroad, was brought to consult me in February, 1929.

In 1919 her relations noticed that her eyes were protruding and she was taken to Edinburgh Royal Infirmary where she was advised to have an operation on her thyroid, but refused. Since then she has had gradually increasing ill-health, palpitation, headaches, insomnia, tremor, and marked loss of flesh. In 1921 she was taken to consult a doctor and because of her maniacal symptoms she was certified insane and spent six months in an asylum. Since then, though her general health had improved, she continued to show symptoms of cerebral derangement, writing letters of abuse to her relations, locking herself in her house, and on one occasion trying to set fire to herself. Her family history is negative as regards insanity.

In February, 1929, against her will but with the permission of her relatives, she was admitted to the Dunfermline and West Fife Hospital under my charge. On admission she was quite irrational and her behaviour was that of a maniac. She was under the delusion that her relatives had employed me to get rid of her. There was marked exophthalmos and tremor. The pulse-rate was 120 per minute. The thyroid was symmetrically enlarged with distended and pulsating veins over the front of the gland. Her teeth were in very bad condition but she refused to have them touched. She refused enemata and hypodermic injections, but was persuaded to take Lugol's solution minims x. t.i.d. and luminal at night.

After 15 days in hospital her mental condition was not improved though her pulse-rate had fallen to 84. On the sixteenth day she was taken to the theatre and under open ether a subtotal thyroidectomy was performed. Forty-eight hours after operation she was quite rational. Twenty-two days after operation she was discharged, her condition mentally having undergone a complete alteration. Her pulse-rate was 60 per minute and her tremor had disappeared.

In July, 1929, she reported having had her teeth extracted. She is living now in peace with her relations who state that her mental condition is normal. Her exophthalmos and other physical signs are now gone and she appears to be a sane woman again.

According to Dr. John Eason, these symptoms of mania may be due to: 1. The action of the toxæmia of hyperthyroidism on the cerebral cells (this is not proved). 2. The effect of various cardiovascular disorders characteristic of exophthalmic goitre upon the cerebral circulation. 3. Coincident focal infections causing toxæmia.

If the mental symptoms are due to either (1) or (2) then, as in the present case, operation for the removal of the toxic thyroid gland appears to me to be the proper line of treatment.

[1] THE LANCET, July 20th, p. 113.

WEST KENT JOINT ISOLATION HOSPITAL.—Lord Cornwallis, Chairman of the Kent County Council, last week opened a new administrative building and nurses' hostel at the West Kent Joint Isolation Hospital at Bromley Common, an institution which serves the borough and rural district of Bromley, and the urban districts of Beckenham, Chislehurst, and Sidcup, with an estimated population of 130,000. Each of the 40 nurses has a separate room, and the administrative offices are extensive enough to provide for the needs of the hospital for many years to come.

BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING IN MANCHESTER.

(*Continued from p. 231.*)

SECTION OF MEDICINE.

TREATMENT OF PLEURITIC EFFUSIONS.

Opening Addresses.

Prof. G. R. MURRAY (Manchester) took the chair at a discussion on this subject opened by Sir THOMAS HORDER. The factors to be considered, he said, were the cause of the infection, the nature and size of the effusion, the stage of the disease, the associated condition of the lung, the degree of illness of the patient, and the contribution made by the effusion, as such, to the illness at the time. The traditional division of effusion into serous and purulent was, he thought, justified. Serous or sero-fibrinous effusions might be tuberculous (primary), rheumatic, influenzal, lymphadenomatous, or neoplastic. They might also perhaps be caused by some other infections besides those mentioned. Purulent effusions (i.e., empyema) might be pneumococcal, streptococcal, staphylococcal, and influenzal (mixed infections), and occasionally gonococcal, coliform, or a result of streptothrix infection. The stage of disease was very important. To remove all effusions on sight was bad practice, whether they were serous or purulent. The associated condition of the lung must be assessed as carefully as possible. Cæteris paribus, active and acute disease of the lung contra-indicated removal of the fluid, since the fluid kept the lung at rest. It was important to decide how far the patient was handicapped by the fluid—whether in toxic or mechanical fashion—and how far he was ill by virtue of his general infection. The more the illness was the result of the general disease, the more carefully and slowly should the effusion be removed.

Most serous effusions, continued Sir Thomas, were tuberculous. If very large, they should be tapped as soon as diagnosed; they should also be tapped if associated with cardiac or respiratory distress. The remainder were tapped if they showed no further signs of absorption after fourteen days from their discovery. Too early interference was meddlesome; too late interference might lead to permanent collapse of lung with chest deformity. The possibility of latent tubercle in the lung must always be borne in mind, and until the case had been properly studied its existence must be assumed. If disease of the lung was established, a conservative policy as regards the effusion was imperative; otherwise there was fear of renewed activity or even pyopneumothorax. Oxygen replacement might be undertaken. Throughout, and afterwards, the patient with no manifest signs of pulmonary disease was treated as though this was present in its early stages. General treatment was instituted; iodine and calcium might be given internally; the arm should be immobilised and the chest strapped on the affected side. In removing serous effusion slow aspiration was probably preferable to syphonage. Injecting drugs into the pleural cavity was of doubtful value, and autoserotherapy had at present too little to its credit to justify more extensive trial. Recurrent effusion might call for the trial of adrenalin or paraffin. Exhaustion by Potain's aspirator must be done carefully and slowly, the last few ounces need not be considered, for they would be rapidly absorbed. A cigarette for the doctor, said Sir Thomas, would give improved results. Local anæsthesia should be effective, and a nick with a sharp scalpel was of considerable value. The ritual of major operations was uncalled for. The volume of fluid removed might require judgment. After-care should be controlled by the tuberculous nature of the disease, and the patient should not return to active life within three months.

Rheumatic effusions were part of an acute and general rheumatic inflammation, carditis being present. Tapping the effusion was rarely necessary. In influenza the effusion was either present with pneumonia—when it should be dealt with palliatively—or followed the acute stage of the disease, when it should give rise to suspicion of tuberculosis.

In empyema, Sir Thomas Horder continued, the surgical maxim, "Evacuate pus as soon as diagnosed," should not be departed from. The time factor was of great importance. The more ill the patient and the more active and extensive the disease in the lung, the more was aspiration indicated and the less was an open method of drainage indicated. One or two aspirations might be all that was necessary, not only in pneumococcal, but also streptococcal disease. When the patient remained very ill, and/or the lung actively diseased, and freer drainage than that given by repeated aspiration nevertheless seemed desirable, trial might be made of incision without resection. As soon as might be, however, the ideal method should be employed—viz., incision with resection of portion of a rib or ribs. Treatment by incision (with or without resection), irrigation, and closure of wound, was successful in some pneumococcal cases, but too often entailed recourse to the open method later to be recommended. It should never be relied upon in streptococcal or staphylococcal cases. Digital exploration at resection operations was of great importance; it broke down adhesions and gave useful information. The question of irrigation of the empyema cavity frequently recurred. Pleural shock might, in the main, be disregarded, but experience scarcely warranted even this risk or the added pain suffered by the patient. Before employing the method coexistent pulmonary abscess should be excluded. The fact that the number of substances used for this purpose was very large suggested that the method lacked adequate justification by results. Of greater importance was the mode of drainage. Perhaps the best—though difficult in children—was to use a closely fitting tube, of considerable length, ending in an air-tight bottle. Such a device allowed of slow drainage and avoided a pneumothorax.

It must never be forgotten, Sir Thomas concluded, that the patient was suffering from a septic disease and also from a respiratory disease. Hence the general measures appropriate to both of these should never be omitted—e.g., ærotherapy, heliotherapy, actinotherapy, and immunotherapy. Residual sinuses should be treated by X rays and sunlight. Failure of the lung to expand would necessitate decortication or Estlander's operation.

Dr. L. S. T. BURRELL (London) directed attention at the outset to two factors—the nature of fluid and the cause of its effusion. Fluid due to heart failure should be removed at once. Of the clear fluids he recognised only tubercle as a cause; the reported rheumatic and other effusions were probably at origin also tuberculous. For treatment the primary question was always whether to aspirate or leave alone. He thought that in all cases the first thing to do was to remove 5 c.cm. for examination. Clear fluid was to be left severely alone, except (*a*) to relieve pressure by removal in part, (*b*) to convert effusion into pneumothorax, (*c*) to allow a lung to expand when its opposite fellow was extensively diseased, or (*d*) to treat a chronic or recurrent effusion. Removal of large volumes of fluid was not without danger; it might cause dyspnœa, or more commonly it might start an acute flare-up of a tuberculous process. Dr. Burrell stated the rule that fluid volumes over 50 ounces should be replaced by gas, selecting air for prolonged action, and oxygen for temporary effect. Fever, he said, was responsible for the degree of illness and the effusion of the fluid, and both would settle down if left alone. Early intervention caused exacerbation in most cases.

In the very chronic cases, among which neoplasm was so common, the treatment he recommended was removal of the fluid, lavage with Carrel-Dakin solution, and filling of the cavity with oxygen to a pressure of minus 6.

After-treatment was of the greatest importance, for over 45 per cent. of cases ultimately developed active

pulmonary involvement, and prolonged sanatorium treatment, with its graduated exercises and education in personal hygiene, was essential.

In purulent exudates a clear difference between pyothorax and no pleural adhesion on the one hand, and empyema with its localisation by adhesions, was the key to treatment. In pneumococcal empyema the lesion appeared when the primary illness was over, and the pus was localised as an empyema. Operation was then successful and no pneumothorax was created. In acute influenzal pneumonia a pyothorax arose in the course of the illness; the fluid was thin and milky. Operation then caused complete pneumothorax, the flexible mediastinum allowing the pressure in the opposite lung to fall also, and death resulted. The presence or absence of pleural adhesion was the key to the treatment; the healing of cavities closed by adhesions could be hastened by Dakin irrigation, which promoted both sterilisation and healing. Thoracoplasty was still sometimes necessary, but should be regarded by the physician as a sign of the failure of his treatment; much might often be done by pleural lavage to avoid it.

Prof. A. RAMSBOTTOM (Manchester) referred to the frequency with which pyrexia in these cases lasted for three weeks, during which time of active disease the fluid could best be left, no damage to the lung resulting. Its removal during the pyrexial stage often led to its reaccumulation, and, provided it was not purulent nor the signs of positive pressure very marked, the fluid was best left alone. The problem of removal of small effusions during the active period of influenzal pneumonia was a difficult one. His practice was to wait until the end of the fourth week, for many effusions resolved within that time; but if the chest wall was tender to pressure over the fluid, then removal at once was indicated. The damage done by removal of pleural fluid was said to be exaggerated, and pleural shock was never seen if it was removed at the rate of ten minutes to the pint.

Discussion.

Dr. WILLARD STONE (California) recounted his experience of empyema in a base hospital, during an epidemic of hæmolytic streptococcal infection, in which 25 per cent. of the residents were found to be carriers. An outbreak of measles was followed by a large number of empyemas, most of them bilateral. Early diagnosis was followed by early operation, the formation of an open pneumothorax and a mortality of 64 per cent. Treatment by repeated aspiration with Potain's aspirator was started to replace operation until after the fourteenth day. This measure reduced the mortality to 8 per cent. Dr. Stone referred to the use of novocaine as a local anæsthetic, and to the use of Brewer's tube, when drainage was required, to form a closed thorax and permit irrigation with Dakin's fluid. The four complications found in the empyema cases were purulent pericarditis (25 per cent.), purulent peritonitis, septic nephritis, and meningitis. The best time to operate on these pyothorax cases seemed to be the 12th–14th day, and the use of antistreptococcal serum appeared to give no help.

The CHAIRMAN thought that when fluid exudates reached the level of the fourth rib, they should be removed at the rate of ten minutes to the pint. The operation should be rendered painless, and he suggested local freezing and the use of a trocar. The Potain aspirator should not be violently exhausted from time to time, but partly exhausted, the negative pressure being maintained by gentle strokes of the pump as required. Full pulmonary expansion after larger effusions was best obtained at high alpine altitudes.

Dr. RUSSELL objected strongly to the great interference with working life, and the mental agony inflicted by a tuberculous outlook in these cases. Treatment by ordinary means was quite satisfactory. A large proportion of autopsies showed tuberculous lesions; therefore prolonged and expensive arrangements, as required by the sanatorium, were unnecessary.—Dr. ASTON KEY spoke of the frequency with which empyema was overlooked in small children, and Dr. ASTLEY CLARKE referred to the use of the boracic immersion bath, and the frequency of sudden death in babies suffering from empyema.—Dr. J. SPEARES mentioned the difficulty of treating chronic sinuses after empyema operation. Breathing exercises as practised in Vienna were valuable.

SECTION OF PATHOLOGY AND BACTERIOLOGY.

BACTERIAL FOOD POISONING.

Prof. J. SHAW (Manchester) DUNN presided over this Section.

Prof. J. CRUICKSHANK (Aberdeen) opened a discussion on the Distribution and Characteristics of Bacterial Food Poisoning. The sporadic nature of outbreaks, the dramatic onset of symptoms and frequent difficulty in tracing the cause, he said, excite interest in all the medical men, but the unexpectedness of the outbreaks both in time and locality hinder systematic investigation. The characteristic symptoms are sudden onset of nausea vomiting, severe diarrhœa, abdominal pain, and pyrexia. The interval between the taking of infected food and the onset of symptoms is short, varying from 2–36 hours. In the majority of cases severe symptoms persist only for a short time, and within 24 hours the patient suffers only from exhaustion. Pyrexia is of short duration, and may be absent. Blood and mucus are rarely found in the stools—a distinguishing feature from dysentery. The extremely short incubation period in some cases has suggested that symptoms result from preformed toxins, and in certain outbreaks there is clear evidence that the suspected food has been subjected to such exposure of heat as would ensure death of all vegetative forms of bacteria.

Since the discovery of Gaertner's bacillus in 1888 a large number of organisms closely allied in morphological and biochemical reactions have been described as the cause of food poisoning in man, or severe enteritis in animals. These organisms are closely allied to *B. paratyphoid* B. The organism most frequently found is *B. aertrycke*. This and closely allied organisms have been demonstrated in the intestines of animals. With extension of bacteriological methods the list of food poisoning organisms is constantly being lengthened, and in many ways has made the problem more difficult, especially for the routine bacteriologist.

An important feature in most outbreaks is that the food is not obviously unsound; this affects investigation, since if all the food has been eaten the cause may remain obscure, unless an organism of the salmonella group can be isolated from the patient's vomit or stools. However, there may be indirect evidence, such as blood agglutination. A puzzling feature in some outbreaks is the small number of individuals affected, although the infected material has been widely distributed. Individual susceptibility, or partial infection of the material, may be the explanation. According to W. G. Savage, human carriers are not to be regarded as playing an important part in infection, but the possibility cannot be excluded.

Among the foodstuffs which have been found to be associated with food poisoning tinned meats are especially important. The possibility of infection from eggs has been raised in a recent case, and it has been shown that severe diarrhœa in chickens and ducks may result from infection with *B. aertrycke*. Milk offers suitable conditions for growth of the organisms, and where this food is the vehicle outbreaks are widespread and severe. When fresh meat is incriminated, the animal from which the joint is cut may have been the subject of salmonella infection. The way in which tinned foods become infected is not clear. It is necessary to suppose that individual tins are infected from an unknown source, and that considerable growth of the organism has occurred with the development of "toxins" which are heat resisting. Prof. Cruickshank observed that he had great difficulty in

accepting the explanation attributing outbreaks to toxins. It would be necessary to postulate a time interval for the development of toxins, and in many outbreaks there is no evidence that these conditions were present. It was inconceivable to him that a few dead organisms could be held responsible for the pronounced symptoms of food poisoning.

With regard to infection from meat of animals, he continued, it is believed that the source of infection arises from the soiling of meat with intestinal contents. If the view of Savage be accepted, that heat stable poisons are the cause of these outbreaks, we must suppose that the organisms have developed in large numbers between the death of the animal and cooking. The infrequency of *B. Gärtner* and *B. suipestifer* in these outbreaks is important, since these types appear to be the most frequent exciting agents of disease in cows and pigs. The occurence of *B. aertrycke* in the diseases of food animals is extremely uncommon, yet *B. aertrycke* is the most common finding in human outbreaks. The view strongly advocated by Savage that salmonella infections account for all food poisonings except those definitely chemical has led to the concentration of investigation upon the discovery of this group of organism with the result that other possible bacterial causes may be missed. A great extension of the bacteriological methods used in attempts to solve the problem of food poisoning is desirable. Evidence of invasion of the blood stream by organisms is rarely obtained, but the development of agglutinins to salmonella organisms occurs frequently. The difficulty of producing agglutinins in experimental animals by administration of the organisms through the alimentary tract makes their occurrence in food poisoning cases all the more remarkable, since their production in the blood is a common phenomenon after parenteral injection of living or dead bacteria. The presence of antibodies in the blood suggest that a living organism is responsible rather than preformed toxins. Savage and Bruce White record the development of agglutinins in rabbits as a result of feeding boiled cultures of *B. aertrycke*, and Geiger and Meyer after feeding to mice and a monkey. The development of agglutinins in rabbits after repeated injections of extracts of suspected meats shown by Savage and White is of little value since the titres obtained are very low.

Much interest lies in the question of the production of heat resistant poisons by salmonella organisms. Savage and White have supported the view that such toxins give rise to food poisoning, but the enormous number of organisms used by them produced only slight lesions; it is impossible to believe that any portion of meat producing poisoning in man could contain such numbers. Unless man is extremely susceptible, these experiments fail to convince. Several workers have obtained negative results by administration of toxin and killed organisms by mouth. On the other hand, Geiger and Meyer claim to have produced definite lesions with a heat resistant toxin derived from *B. aertrycke*. The animals used were mice. Rabbits, guinea-pigs, and cats usually presented very transitory symptoms, and it is remarkable that such difficulty should be encountered in producing toxic manifestations in animals which are frequently the subjects of natural infection. Further experiments on monkeys may prove of value. As a result of a survey of epidemics of paratyphoid fever, Savage and White have come to the conclusion that symptoms of food poisoning are absent in these outbreaks. In some cases, however, the symptoms of food poisoning definitely occur; it is doubtful whether a rigid separation of food poisoning from paratyphoid fever is justifiable on clinical grounds. On the other hand, organisms of the *B. suipestifer* group may produce symptoms resembling typhoid fever. The outbreak of food poisoning due to *B. aertrycke* in our troops in France, recorded by Perry and Tidy, suggests that a chronic carrier was the cause of initiation of the outbreak. In civil life the outbreaks are rarely examined so minutely. The work of Bruce White on the salmonella group is of great importance, especially in showing that the organism isolated in the majority of cases of food poisoning is *B. aertrycke*. The problem of the source of infection still remains obscure.

Discussion.

Dr. W. G. Savage (Weston-super-Mare) said that he did not consider that all cases of food poisoning were due to salmonella organisms, nor that human carriers could be completely excluded as possible source of infection. Dr. Savage dealt at some length with the possibilities of the occurrence of preformed toxins. He considered that the evidence justified the claim that such toxins can be formed by salmonella organisms; from his investigation of the canning process in America, he found that a time interval was often present between obtaining the meat and canning it. The food was undoubtedly sterile when eaten, and the time incidence of occurrence of symptoms greatly supported his view. The apparent lack of support obtained in animal experiments he considered to be due to the comparative greater susceptibility of man to these toxins.

Mr. P. Bruce White (London) dealt with the classification of organisms of the food poisoning group. Several genera were believed to be implicated, and dysentery and salmonella groups were definitely associated with the disease. A very large number of species had been described; many of which were not separate types, but the introduction of agglutination tests had led to systematic classification. The speaker described the specific and non-specific antigen character of members of the group.

Dr. W. Scott (London) described interesting and important evidence to show that eggs may be responsible for certain cases of food poisoning. He described several outbreaks of food poisoning in which all possible infection, other than eggs, had been excluded, and although there was no absolute proof, circumstantial evidence tended to show that eggs were responsible. Duck's eggs appeared to be far more dangerous in this respect than hen's eggs. An epizoötic among ducklings was described, in which *B. aertrycke* had been isolated. There was some doubt as to the way that eggs become infected. It had been suggested that introduction of foreign material into the oviducts during copulation might infect the white of the egg. Eggs placed in a fluid culture of *B. aertrycke* might become infected, but negative results had been obtained with dry cultures. Ducks fed with *B. aertrycke* passed large numbers of these organisms in their excreta. The dry surroundings that hens chose for egg-laying might account for the smaller liability to infection of their eggs. The great importance of recognising that eggs might be a source of infection lay in the fact that many of the single sporadic cases of food poisoning which occurred might be explained in this way, since eggs were probably the most common unshared dish consumed in this country.

Dr. D. Nabarro (London) discussed the relation of food poisoning to dysentery. He pointed out that dysentery is not uncommon in children in this country, and that the possibility of this infection should be always kept in mind in suspected cases of food poisoning.

Bacillus Abortus Infection in Man.

Dr. W. D. Champneys (London) read a paper on *Bacillus abortus* Infection in Man. He showed that the number of cases of this disease recorded in European countries was steadily increasing now that it is recognised that an undulant fever can be produced by an organism which belongs to the same (brucella) group as *Micrococcus melitensis* and occurs in cow's milk. In addition to those who might acquire infection from drinking milk, persons handling living and dead cattle might be subjects of infection. The organism responsible, *B. abortus*, was killed by pasteurisation. This organism had been injected into human beings by some workers without the production of harmful effects. The symptoms of the infection were almost identical with those of Mediterranean fever, and accurate diagnosis could only be made by hæmoculture and agglutinin tests. Injection of suspected blood in guinea-pigs was an excellent method of

investigation. The speaker believed that if systematic examination for brucella infection was made in cases of pyrexia of obscure origin, the number of cases of this infection would probably be found to be much greater than was suggested by the present statistics.

Prof. MEYER (California) communicated a paper which was read in his absence. He had investigated various strains of the brucella group, and described variation in virulence of various strains in monkeys. He pointed out that many individual animals possess a natural immunity for such infections. Cultures kept for long periods tended to lose their virulence.

Dr. G. ROSS (Rhodesia) described the occurrence in Africa of cases of undulant fever due to *B. abortus*. He had made systematic examination of cases of pyrexia, which had been diagnosed as such conditions as phthisis and influenza, and found them to be brucella infections. If attempt at hæmoculture was made, patience was necessary, since the organism rarely appeared in the first six days, and might require 10–14 days. The treatment he considered very unsatisfactory; vaccines were not recommended in the pyrexial stage.

Dr. W. PARRY MORGAN (Cardiff) described four cases of brucella infection which he had investigated, the first occurring in 1912, and two within the last year. He had examined 40 samples of blood submitted for Widal reaction, and found that two of them gave positive agglutination with *B. abortus*. A number of samples of milk had also been examined by injection into guinea-pigs, and 25 per cent. of these developed agglutinins. The *B. abortus* was isolated from some of these cases, but only when it was cultivated in an atmosphere of CO_2. He emphasised the importance of recognising the marked inhibition zone in the serum agglutination.

SECTION OF OBSTETRICS AND GYNÆCOLOGY.

CHRONIC CERVICITIS (LEUKORRHŒA).

Prof. FLETCHER SHAW (Manchester), the President, was in the chair when

Mr. J. BARRIS (London) read a paper on the Ætiology and Symptoms of Chronic Cervicitis. He defined this as an inflammatory affection, involving the mucous membrane of the cervical canal and os uteri externum, characterised by leukorrhœa, erosion, and microscopic signs of inflammation. After describing the anatomy and development of the generative tract with especial reference to the changes in the epithelial lining, the speaker said that bacteria were not normally found above the external os. In chronic cervicitis, however, bacteriological investigation revealed the presence of pathogenic organisms. The invasion might be the result of direct infection, or of indirect infection following injuries to the cervix. Mr. Barris showed figures to illustrate that the condition was most common in the child-bearing period. A consideration of the complications of chronic cervicitis made evident its importance. Mr. Barris described the cervix as the tonsil of the pelvis, and stressed the fact that it may act as a focus of infection. In conclusion, he referred to K.V. Bailey's work on the basic cause of cervical cancer and its relationship to chronic cervicitis.

Mr. G. I. STRACHAN (Cardiff) spoke on the pathology of chronic cervicitis, explaining that the anatomical relations of the cervix were important in this connexion. The essential lesion in cervicitis, he said, is irritation produced by pyogenic infection, most usually brought about by the lacerations consequent on childbirth. There is œdema of the sub-epithelial stroma with outpouring of lymphocytes and plasma cells, especially round the blood-vessels and glands, and under the surface epithelium. The blood-vessels dilate, the surface columnar and glandular epithelium become irritated, so that glandular hypertrophy with distension occurs, and the cervical secretion becomes increased in amount and of a muco-purulent appearance. Some of the squamous epithelium surrounding the external os becomes separated and cast off in the discharge, and the columnar epithelium is stimulated and grows down to cover the raw area, carrying with it in its outgrowth cervical racemose glands giving rise to the appearance described by Eden and Lockyer as pseudoadenoma. In discussing the late results of cervicitis, Mr. Strachan said that the parametrium was frequently affected by lymphatic extension from the cervix, so that in the early stages infiltration and later fibrosis was produced. The parametrial extensions were the most common causes of backache or chronic pelvic pain in women. Absorption of toxins from the chronically inflamed cervical surface led, in some cases, to general ill-health, shown clinically by muscular rheumatism and osteoarthritis. Mr. Strachan pointed out that while severe puerperal sepsis accompanied by pyrexia occurred in about four cases per 1000, puerperal sepsis in a minor degree occurred in a large proportion of all parturient women. Often no symptoms were manifest at the time, but the results of the infection lasted for many years, and carried with them a risk of carcinoma formation.

Dr. R. S. STATHAM (Bristol) spoke on treatment, expressing his personal views. He thought that chronic endocervicitis was one of the commonest causes of sterility and perhaps even more often of the one-child marriage. Mild thickening and inflammation of the pelvic cellular tissues gave rise to pressure on the ureter, with chronic backache and renal pain. This process had been described by Guy Hunner, and had stimulated Dr. Statham to pass ureteric bougies in certain cases of backache associated with cervical erosion, much benefit having ensued. There were two factors to be treated: (1) the leukorrhœa, and (2) the deep infection. Cervical lacerations should be repaired at the time of confinement. In venereal clinics Dr. Statham had observed typical erosions developing in cases of gonorrhœa, as well as in patients complaining of leukorrhœa and cervicitis in whom gonococci were found on further investigation. When gonococci were found Dr. Statham thought that the best treatment was daily douching with boric acid lotion, and when the discharge had been wiped away, thorough swabbing of the cervix and vagina with 1 per cent. mercurochrome. In the cases where there was laceration of the cervix with thickening and tenderness of the bases of the broad ligaments—a mild grade cellulitis—the best results were obtained by prolonged hot douching by a skilled person; in private practice treatment could be carried out while the patient lay in a hot bath. Excellent results were obtained with the diathermy current in certain cases. When no response to treatment was observed, either repair operations or amputations or panhysterectomy should be undertaken according to the indications for the particular case. The speaker did not advise amputation of the cervix in young patients since it predisposed to abortion, and in one of his cases had led to cicatrisation, causing much trouble in labour. In elderly patients, especially in the presence of the so-called "fibrosis uteri," the operation of election was panhysterectomy combined with perineal repair when necessary. If true ulceration was found upon the cervix it was essential to remove a portion for histological examination. Finally, Dr. Statham advocated inspecting the cervix after delivery, and suturing any lacerations immediately.

General Discussion.

Dr. J. YOUNG (Edinburgh) emphasised the importance of erosion as a cause of chronic ill-health such as arthritis, rheumatism, and chronic heart disease. He thought that a good deal of abdominal pain could follow cervicitis. Dr. Young considered the best treatment to be a free opening up of the cervix by means of the surgical cautery. He had not encountered ureteral stricture in cases of cervicitis.

Prof. T. CULLEN (Baltimore) said that the cylindrical epithelium of the cervical canal sometimes extended over the vaginal portion of the cervix, whilst he had seen the squamous epithelium reaching almost up to the internal os. He thought that irrigation was going to prove the most efficacious treatment. Referring to operative treatment, he thought that it was sufficient to repair one side only. Prof. Cullen

never removed the uterus for prolapse in old women, since it was the keystone of the pelvis. He praised Hunner's work on ureteral stricture.

Mr. L. C. RIVETT (London) said that he had closely questioned many patients suffering from cervical cancer, and could not illicit any history of leukorrhœa to suggest preceding erosion; he had not encountered any patients with leukorrhœa who had developed carcinoma.

Dr. B. SOLOMONS (Dublin) advised a modified Schröder operation under general or local anæsthesia for erosion, and did not think that either mercurochrome or any of the other local applications produced permanent benefit. Many women could be cured by means of constitutional treatment. Hysterectomy should be left to the very last, and only be undertaken after very careful consideration. Dr. Solomons considered it very dangerous to teach students to examine and repair all cervices immediately after labour; in his view the right procedure was to examine the patients six weeks after the birth of the child, and then carry out any plastic operation necessary.

Dr. C. FORBES (Aberdeen) thought that the products of split protein might be the cause of erosion and leukorrhœa.

Prof. C. G. LOWRY (Belfast) referred to the importance of the cervix as a focus of infection, and mentioned an investigation which they had been carrying out on cases of rheumatism, with a view to finding out whether the cervix was the source of infection. He pointed out the difficulty of finding gonococci and in deciding how many cases were attributable to this organism. He did not agree with those who said leukorrhœa caused sterility in all cases.

Dr. K. V. BAILEY (Manchester) was chiefly interested in the pathology, and pointed out that the connexion of chronic cervicitis and cancer can be traced histologically. Cancer was the result of a constant contact with chronic irritative exudates of specific types.

Dr. J. RIDDELL (Plymouth) thought that the term erosion should be dropped entirely for cervicitis. He considered that there ought to be a time-limit for medicinal treatment, and suggested that surgical procedures should be resorted to at the end of six months. He deprecated the adoption of vaginal hysterectomy, and said that the abdominal operation should be chosen in order that a more adequate investigation might be made.

Dr. F. MURRAY (Newcastle) said that a thorough investigation should be carried out before any treatment was undertaken. He had found that there was often an infected urine which should be treated at the same time. In cases where there had been extensive lacerations of the cervix, reparative operations might be dangerous owing to the close proximity of the large venous plexus and the ureters. He had had excellent results from instilling into the vagina, whilst the patient lay on her back, about two ounces of a mixture of one part of tincture of iodine and two parts of glycerine.

Dr. K. FOSTER (Worcester) held that the cause of erosion was injury at birth; proper antenatal care would prevent the need for deliveries by forceps, and would therefore diminish the incidence of erosions.

Prof. I. P. MAXWELL (Pekin) said that he had been n the habit of taking a section for microscopical examination from the cervix of every patient whose symptoms did not clear up rapidly under skilled douching (which he had been employing for some considerable time), with the result that he had succeeded in discovering a number of early carcinomata.

Prof. D. DOUGAL (Manchester) thought that curettage and amputation of the cervix would cure a certain number of cases.—The PRESIDENT did not think enough had been said about cauterisation as a method of treatment. He considered that douching tended to keep up a chronic discharge. Leukorrhœa began to worry the patient as her general health deteriorated, and with improvement of the constitutional condition the discharge produced no discomfort.

Dr. STATHAM, Mr. STRACHAN, and Mr. BARRIS replied.

SECTION OF OCCUPATIONAL DISEASES.

THE PRESENT POSITION OF SILICOSIS IN BRITAIN.

The discussion was opened by Dr. E. L. MIDDLETON, H.M. Medical Inspector of Factories, who dealt with (1) the occurrence of the disease in the various industries throughout this country; (2) the manifestations of the disease as it presented itself to medical practitioners; and (3) the legislation which had been brought into being within recent years. In a brief review of the ætiology, symptomatology, and pathology of the disease Dr. Middleton remarked that silicosis was produced by the inhalation of particles of silica, and in silicosis, properly so-called, the silica was in the form of free dioxide of silicon (SiO_2)—e.g., quartz or flint. The particles, to produce the disease, must be inhaled into the ultimate pulmonary tissue, and must therefore be of a degree of minuteness which would permit of their free passage in the mid-current of the air through the upper respiratory passages and the finest bronchial tubes. The particles were phagocyted and the lymphatic channels, perivascular and peribronchial, contained deposits of these cells which produced a reaction in the surrounding tissue. Fibroblasts were produced, changing ultimately into fibrous tissue which underwent condensation and contraction resulting in distortion with loss of function of the remaining lung tissue. Foci of tuberculosis were commonly found embedded in the dense fibrous tissue. In some cases no massive fibrotic areas were found, but in both lungs nodules varying in size from 0·1 to 1·0 cm. in diameter were present in large numbers. Sections of the lung showed the nodules to be formed in a characteristically whorled arrangement of fibrous tissue, and often particles which (if 5μ in diameter) could be demonstrated by polarised light.

The inhalation of silica dust was not usually accompanied by evidences of irritation. When free from other dusts of an irritating kind silica might be inhaled by workers without any suspicion that they were exposed to dangerous dust. Herein lay the perils of indifference on the part of the worker and absence of suspicion on the part of the employer. Dyspnœa was usually the first symptom, and in its production two characters of silicosis were important. The first was the cumulative action of silica and the second the latent period for anatomical changes to take place in the lung. Symptoms might follow exposure to silica dust at any time from 2 to 40 years. One of the problems to be solved was: Is the disease recognisable at a stage when removal from exposure to silica dust will not be followed by disablement? In diagnosis, said Dr. Middleton, the employment history should be exhaustively studied, while a careful clinical examination, and a radiological examination by an expert were essential. Prognosis depended on (1) the amount of dust inhaled; (2) the period of time over which this acted; (3) the occurrence of infective processes, tuberculous or non-tuberculous. If the diagnosis could be made at such an early stage in the disease that sufficient silica had not been inhaled to produce irreparable damage, and so much damage has not been done as to produce disability, then it seemed that the disease could be arrested.

Dr. Middleton went on to discuss the industries in which silicosis occurred. The *Refractories Industry* employed 2000 to 3000 persons and was concerned with the manufacture of ganister and silica bricks. These bricks contained considerably over 90 per cent. of silica. A specialist medical board carried out periodical medical examination of all the persons employed. The *Sandstone Industry* represented the most widespread of all silicosis-producing industries, but the incidence of the disease was diminishing owing to the application of water and mechanical methods of dust suppression. The granite industry was allied to sandstone quarrying and dressing, but the subject was complicated because of the varying proportions of quartz, felspar, and mica present in the rock. As the result of an inquiry into the *Slate Industry* there appeared to be some evidence of the

production of fibrosis of the lungs, but the occurrence of actual disability within the ordinary working lifetime of workers was not clearly shown. In the *Grinding of Metals* silicosis, and especially the combined disease of silicosis with tuberculosis, were at one time extremely prevalent. The sandstone wheel was being largely replaced by wheels of abrasives such as carborundum. Allied to the grinding of metals was the process of *Sand-blasting* of metals and the etching of glass. This consisted in playing a jet of sand under high pressure against a metal or glass surface to produce certain effects. The process was becoming more extensively used, and it was a matter for serious consideration whether a substitute such as iron or steel grit could not be used to replace the siliceous grit as the abrading material. In *Pottery Manufacture*, both in the manufacture of earthenware and of china, Dr. Middleton suggested that "potter's asthma" was due to dust containing ground flint. Ground silica was used in many industries; in the crushing and grinding of silica and in the industries in which ground silica was used silicosis sometimes of an acute type occurred. The evolution of dust in these industries was controlled by the use of mechanical methods of handling, enclosure of machinery, and the use of localised exhaust draught. *Tin Mining* in Cornwall had a high mortality-rate from tuberculosis, and it was shown that this was associated with silicosis. Drilling of the highly siliceous rock in which the tin ore occurred was now done through hollow steel with a water feed. Silicosis also occurred in *Coal-miners* employed on hard headings. It would appear that once enough silica had been inhaled to produce the nucleus of fibrosis, the resulting inhalation of coal dust into a lung in which the lymphatic drainage had been disorganised increased the fibrosis and produced disability.

Dr. Middleton concluded by describing the methods for determining the concentration of dust in the atmosphere by the gravimetric method and the numerical or counting method, but pointed out that there was no criterion of air dustiness which could safely be regarded as indicating freedom from risk of producing the disease.

Dr. P. HEFFERNAN (Tuberculosis Officer, Derbyshire) read a paper on the biophysics of silica and the ætiology of silicosis. Silicosis, he concluded, was the result of the local action of hydrated silica upon the pulmonary tissue. This action was of a physico-chemical nature, and the speed of its development depended upon the rapidity with which fresh silica hydrosol was brought into contact with pulmonary tissues. Substances such as alkalis which favoured the formation of silica hydrosol from silica when added to silica dust accelerated the development of silicosis. Substances such as carbon, coal dust, or clays which retarded or prevented the formation of hydrosol from silica, or which coagulated the hydrosol when formed, retarded or prevented silicosis. Silica was a normal constituent of plant and animal cells and had a place in therapeutics comparable to that of lime.

Dr. WATKINS PITCHFORD (South Africa) spoke on siliceous dust in gold mining and uttered a warning about wet operations; siliceous mud, he said, was potentially siliceous dust. The noxiousness of siliceous dust was due to blocking of the lymph channels of the lung which allowed tuberculosis to develop.

Dr. R. E. LANE (Manchester) read a paper on the lead dust hazard. He showed that in industrial practice by far the most important portal of entry for lead was the respiratory tract. He spoke of the storage battery industry and of the types of lead dust met with in that industry. He emphasised the fact that normal healthy people both excreted lead in the urine in measurable quantities and showed minor degrees of punctate basophilia. In a research carried out on groups of lead workers in various departments he had found a definite relationship between the Pb. in the atmosphere, the Pb. excreted in the urine, and the punctate basophilia count; the basophilia could be used in estimating the danger arising from a lead process. He supported the findings of Sellars that all lead workers have a normal punctate basophilia, and that its mere presence cannot be taken as a proof of lead poisoning. It was, however, a delicate index of the degree of absorption, and as such of great value in anticipating trouble.

INDUSTRIAL TUMOURS OF THE BLADDER.

Dr. T. H. WIGNALL (Manchester) opened a discussion on the incidence of disease of the bladder in workers in certain chemicals. Certain chemical agents, he said, were known to cause forms of acute dermatitis and conjunctivitis, or bronchial and nasal troubles; others (for example, aniline) by absorption, ingestion, or inhalation, produced pigmentation, visible on face, hands, and ears, as well as general bodily weakness, dyspnœa, and possibly blood in the urine, owing to the production of methæmoglobin in the blood. Such cases, seen early and treated, recovered health, and he had not heard of any subsequent growths from acute illnesses of this type. Men working on *a*-naphthylamine for some years reported a frequent desire to micturate with strangury and blood in the urine. Cystoscopic examination revealed a neoplasm at the ureteric orifice in the bladder.

Mr. J. B. MACALPINE (Manchester) showed lantern slides and pathological specimens of carcinoma and papilloma of the bladder in aniline workers, many of whom were sent to him by Dr. Wignall. The growth in these workers would appear to be more malignant than similar growth in the general population.

Dr. ARCHIBALD LEITCH (London) spoke on experimental work with aniline dye-products. He had had no neoplastic response to any particular substance in mice, and suggested that the final carcinogenic agent was an end-product actually produced in the bladder itself.

Prof. J. M. STEWART (Leeds) suggested that inhalation of aniline dust rather than ingestion was the cause of the urinary troubles.

Dr. VERNON DAVIES, M.P., asked if anyone could give a definite opinion as to whether synthetic dyes did cause carcinoma of the urinary tract.

The PRESIDENT said that without doubt these tumours were far more prevalent among synthetic dye workers than in the general population, but no particular substance at the present moment could be blamed.

Dr. DONALD CAMPBELL (St. Helens) read a paper on the silicotic lung, in which he discussed the early diagnosis and differential diagnosis of the various fibroses of the lung, the importance of finding silica in the sputum, and of radiograms taken by an expert.

Dr. L. CAROZZI (Geneva) spoke on the human aspect of industrial diseases and accidents, and the need of utilising to the full the result of scientific investigation in other fields: physiology, pathology, and biochemistry. He dealt with idiosyncrasies in absorption and elimination in certain industrial skin diseases and industrial cancer, and stressed the necessity of constant medical examination of all workers, not only the sick but those in good health.

Mr. L. WARD (Engineering Inspector of Factories) gave a lantern demonstration of methods of prevention of industrial dusts.

The PRESIDENT illustrated the various processes of the cotton industry by lantern slides, and pointed out the dangers to health during each process.

Dr. E. S. BURT HAMILTON (Manchester) read a paper dealing with skin and mucous membrane lesions in chrome and arsenic workers.

In the pathological museum there was a large display of specimens, photographs, and charts contributed by Sir Thomas Legge, Prof. Stewart, Dr. Heffernan, Dr. Lane, Dr. S. A. Henry, Dr. C. C. Twort, Dr. Middleton, Dr. Cooke, and Dr. R. Prosser White.

SECTION OF ORTHOPÆDICS.

Scoliosis.

Opening Address.

Sir ROBERT JONES presiding, a discussion on scoliosis was opened by Mr. D. MCCRAE AITKEN (London), who introduced a cinematograph film illustrating his methods and results. He pointed out that scoliosis was one of the earliest, as it was still one of the most difficult, problems of orthopædic surgery, and said that the observations of the early writers were as accurate and practically as valuable as those of to-day. It was the principles, not the details of treatment that mattered. He traced briefly the evolution of his own methods of treatment, wherein he had tried to apply to the spinal joints the principles laid down by Sir Robert Jones for other joints—i.e., continuous retention of the correct position while recovery of muscular function was taking place. His conception of these principles had been somewhat modified by the experiments of Sherrington and Magnus, which showed the importance of the inhibitory reflex, and that contractures, such as those of scoliosis, were often due as much to active shortening of muscle as to fibrosis. The postural reflex was largely a new name for the phenomenon long known to psychologists as the "automatic reflex," which played a large part in the training of athletes. Haglund, in using his short plaster jacket to tilt the lumbar region, had been one of the first to harness the postural reflexes to correction of the deformity. Mr. Aitken had found a modification of the Abbott type of jacket the most effective, because of its flexion of the spine to correct what he called the "squint lordosis," its pressure on the prominent ribs altering their habitual excursion into a more favourable one, and its power to deviate the patient's weight on to the leg opposite to the one he habitually used. This last point was important, and the speaker demonstrated that the side of the chest on the same side as the leg taking most weight was the one which expanded most, both with quiet and forced respiration—a phenomenon used by rowers for turning a boat, to do which they merely pressed harder on one foot.

An admirable film, produced by the Stoll Co., illustrated the points referred to by Mr. Aitken, especially the unequal breathing on the two sides of the chest. It also demonstrated each stage in his application of the modified Abbott jacket, and showed the patients standing and walking after the treatment. Without the previous photographs it would have been hard to believe how severe the initial deformity had been. With good team work, Mr. Aitken stated he could apply one of these jackets in half an hour. Correction was best maintained, he said, if the patients were taught only simple exercises for use in their own homes, not being allowed to depend on the atmosphere of the gymnasium. Besides the important exercise of sitting with pressure on the foot of the suitable side and standing on that leg, he strongly recommended the recumbent breathing and posture exercises of Goldthwait, of Boston, of which Miss Forrester-Brown had been the chief exponent in this country.

Discussion.

Mr. A. BLUNDELL BANKART (London), while congratulating Mr. Aitken on his results, expressed the conviction that even better ones would ultimately be attained if research continued. He thought scoliosis was essentially a contracture of a compound joint and that correction of the mechanical defect should precede education of the muscles. For this purpose he still advocated traction, for he did not believe effective pressure could be brought to bear on the spine through the ribs. Abbott's method only achieved a high degree of compensation, not actual correction of the defect, and this was disappointing. Scoliosis was a growth defect, comparable to club-foot and equally difficult to correct permanently. He suggested that there might be possibilities in skeletal traction.

Miss M. FORRESTER-BROWN (Bath) analysed the treatment of 65 cases, most of which were old neglected ones coming too late for correction but still amenable to great improvement in the general body balance and health. Only five had had correction in plaster jackets, and this had been applied by a modification of Galeazzi's method with the patient standing with the spine flexed. The shoulders and pelvis were included in independent parts and then joined together, while an attempt was made to correct the rotation deformity. A number of cases had got considerable gradual correction by sleeping for years on a plaster bed of Jansen's type. More than half the cases had required braces to support the spine, and in the manufacture of these the speaker emphasised the necessity of having the plaster mould made by an expert, while the positive model on which the jacket was to be built must be modified by, or under the eyes of, the surgeon. To hand the patient over to an instrument-maker without further surgical guidance was very unsatisfactory. In regard to the upper thoracic and cervical curves, which Mr. Aitken regarded as desperate, Miss Forrester-Brown had found that improvement of balance resulted from Elmslie's method of keeping the head a little suspended when the patient was seated during lessons. This helped the postural re-education. Although one might hope to prevent the majority of these severe cases by early diagnosis and treatment, some of the rickety and paralytic ones developed very insidiously, and parents were extraordinarily unobservant. Congenital cases were tedious to treat and the condition was apt to occur in poor homes, where they would be neglected.

Mr. P. B. ROTH (London) disagreed with Mr. Aitken's assumptions, saying that scoliosis was primarily a bone disease with no muscle defect, and that wedge-shaped vertebræ could not be straightened again with intermittent pressure from bent ribs. He thought that the best results were got from muscle-training in a gymnasium.

Mr. AITKEN, in his reply, said that nobody claimed to undo the wedging of the vertebræ, but only to mask it by improved body balance. He added that his plaster jackets did not interfere with school life, and the children played hockey in them.

Torticollis.

Mr. WHITCHURCH HOWELL (London) then read a paper on the treatment of torticollis. He advised subcutaneous tenotomy, done with very special precautions and followed by immediate fixation in the over-corrected position in plaster-of-Paris, which must include the whole chest and bear well on the mastoids and lower jaw. He quoted 20 successful cases out of 21 and showed slides of two excellent results.

A discussion followed in which the speakers were: Mr. R. OLLERENSHAW (Manchester), Mr. ROTH, Dr. WHITE (Norwich), Mr. AITKEN, and Miss G. HERZFELD (Edinburgh). Most of these, except Mr. Roth, deprecated the subcutaneous method as dangerous, except in the hands of someone of special experience such as the reader of the paper. They also considered it likely to be ineffective, because the fibrosis was seldom restricted to the sterno-mastoid muscle, usually involving not only its sheath but all the layers of deep fascia, often the arterial sheath itself, so that radical cure demanded a wide and careful dissection. They did not regard plaster fixation as necessary after the thorough operation, nor did they find a carefully placed skin scar to be conspicuous or troublesome.

CHELTENHAM GENERAL HOSPITAL.—This institution has been enlarged by the addition of 23 beds, a new out-patients' department, and an extension of the nurses' home. The work has cost £32,000.

ENLARGEMENT OF WAKEFIELD CLAYTON HOSPITAL. Mr. S. Canning Childs, of Camden, New Jersey, U.S.A., who last year gave a new out-patients' department to this hospital, is now presenting it with a new women's ward, which will have 48 beds, and will cost £30,000.

Reviews and Notices of Books.

STONE AND CALCULOUS DISEASE OF THE URINARY ORGANS.

By T. SWIFT JOLY, F.R.C.S., Surgeon to St. Peter's Hospital. London: William Heinemann, Ltd. 1929. Pp. 568. 45*s*.

THE author has presented us with a work that will surely be found on bookshelves abroad as well as at home, for great changes have taken place in this special branch of surgery during 20 years. Genito-urinary surgery, and particularly that branch which concerns the treatment of stone, has been revolutionised by the introduction of radiography and cystoscopy. The era of the exploratory operation for calculus has passed, the surgeon of to-day possessing a fairly exact knowledge of what he will find before he makes his preliminary incision. But, as Mr. Swift Joly points out in his preface, there exists yet another reason for bringing our knowledge of lithiasis up to date. Methods of diagnosis and treatment have changed, but so also has the disease itself. In certain areas of Great Britain, such as Norfolk and the Fen district, vesical calculus was formerly common; now it is comparatively rare. This is true to a less degree of other localities, for throughout the country vesical calculi are becoming less common, whilst the frequency of renal lithiasis remains about the same. The age and class incidence of the disease have also altered, so that it is no longer a disease of childhood found amongst the poorer classes, but of middle and of old age, occurring without discrimination of class. The reasons for these changes are discussed by the author at length in his second chapter. Stone formation, he points out, is due to a failure of the urinary colloids to hold the more insoluble urinary salts in solution. The change in its incidence witnessed in the last 50 years may perhaps be correlated with a general improvement in our dietary. There are reasons for believing that the excretion of an excessive quantity of uric acid is part of a deficiency disease, whilst oxaluria is often associated with intestinal fermentation. The more rational and varied dietary of modern times has the effect of diminishing both of these predisposing causes of stone formation.

Chapter III. deals with the diagnosis and treatment of renal calculus. In discussing its surgery the author shows a marked preference for the L-shaped incision recommended by Mayo, which commences over the last rib at the outer border of the erector spinæ and then passes outwards parallel to and about 1 inch above the iliac crest. If additional room is required, he advocates dislocating the last rib upwards over the eleventh rather than excising it. Pyelotomy, in his opinion, should always be followed by suturing the pelvis. Leakage of urine favours infection of the kidney, and this in clean cases is a disastrous sequel. When subcapsular nephrectomy is undertaken, Mr. Joly urges that every effort should be made to remove the whole of the renal pelvis. This is best achieved by Albarran's method of exposing the renal pedicle through a vertical incision in the lower portion of the stripped back capsuli. If this is not done a very thick pedicle is tied off containing the whole of the renal pelvis. As these cases are invariably infected a persistent sinus almost inevitably follows.

Mr. Joly holds the view that, generally speaking, surgeons err on the side of being too conservative in their surgical attack on stone. In many cases in which a pyelotomy or nephrolithotomy has been performed much future trouble would have been avoided if nephrectomy had been substituted. The aim should be to deal in the most efficient way with sepsis, and a prompt nephrectomy or nephro-ureterectomy, by totally eradicating the diseased area, may save the opposite side from subsequent trouble. In dealing with impacted ureteric calculi non-operative measures should only be attempted when the stone is lodged in the lower portion of the ureter. Even then the surgeon should be prepared to do an open operation after one failure to obtain expulsion by other means. The work concludes with adequate chapters on calculous anuria, vesical, prostatic, and urethral calculi. At the end of each chapter a table of references gives an indication of the author's extensive acquaintance with the literature of calculus, and at the beginning of the book is an entertaining historical sketch which takes the reader from 7000 B.C. up to A.D. 1924. Although illustrated with less profusion than most of the works that come from the other side of the Atlantic, the plates and diagrams are adequate and of good quality. The text throughout is clear, and the treatment of the subject practicable. Mr. Joly may enjoy the satisfaction that comes from knowing that he has written a standard work on the subject he has made his own, and we predict that Joly on Stone will be as well known to urologists of the present generation as was Jacobson on Surgery to surgeons of the last.

PHARMACY.

Pharmaceutical Formulas. Vol. I. Tenth edition, entirely revised and rewritten by S. W. WOOLLEY and G. P. FORRESTER. London: The *Chemist and Druggist*. 1929. Pp. 1146. 15*s*.

THIS is the tenth edition of a valuable book of reference which has appeared at steady intervals for the last 30 years. The original design of the book remains—that is to say, that we have here a collection of formulas for old as well as new preparations, which not only pharmacists and others in the drug and allied trades require, but which a great many medical practitioners will find of practical value. The present edition has been entirely revised and rewritten by Mr. S. W. Woolley, a former editor of the *Chemist and Druggist*, and Mr. G. P. Forrester, who now occupies that post; and their emendations have been directed towards the satisfaction of fresh demands, and recording progress in the art of compounding. As the authors point out in their preface, great advances have been made throughout the domains of pharmacy within recent years, coincident in many directions with advances in medicine, consequently many therapeutic agents have been added to materia medica, and improvements as well as innovations introduced in the manufacture of pharmaceutical preparations.

The volume is made up of selected formulas from the British, United States, and other pharmacopœias, together with non-official formulas from various sources, including numerous descriptions of practical methods employed in the manufacture of pharmaceutical preparations and other information of use to pharmacists and drug-producing firms, and of increasing interest to doctors. The pages comprise also a selection of formulas for "known admitted and approved remedies" from former editions and from the *Chemist and Druggist* diaries. The practical nature of the book is reflected in the fact that its contents in many instances represent inquiries received by the editor of the *Chemist and Druggist* from chemists and manufacturers at home and abroad, and seeking particulars regarding recent medicaments, and preparations included in hospital or foreign pharmacopœias. Many of these questions have had reference to formulas designated by the name of their authors or originators, and, as we can quite understand, the editor of our contemporary has had great difficulty in some instances in rendering correct replies. The employment of such titles for a prescription as "Stokes' Expectorant," "Franklin's Formula," "Griffith's Green Mixture," "Heberden's Ink," and so forth, is of historic interest, but from a scientific point of view the sooner these nicknames disappear the better.

A second volume, now in course of preparation, will contain formulas which cannot properly be classed as pharmaceutical, such as recipes and processes for the preparation of a wide range of articles which contribute to the interests of modern life. This promises to be very interesting, and, judging from the analogy of

"Cooley," of high practical value. For it is a little astonishing to find how many articles of daily use are mysteries, as far as their composition is concerned, to those who are familiar with their frequent application.

Physics for Students of Pharmacy. By C. J. SMITH, Ph.D. London: Edward Arnold and Co. 1929. Pp. 287. 9*s*.

THERE are to-day so many books, small, middle-sized, and large, compiled to meet the needs of the commencing science student, that a first impression on seeing yet another elementary text-book of physics necessarily is that there can hardly be room for it. Dr. Smith, however, has arguments to the contrary. He has thought that the syllabus of the Pharmaceutical Society of Great Britain invited a manual to meet the needs of those who would comply with the professional tests, and he has accordingly furnished some excellently clear instruction, in which the brevity of the first sections is accounted for by the fact that he has expected his readers to have done a course of matriculation physics at some previous period. Epitomising has been the author's aim, but always with the endeavour to make definitions clear, and his objects are accomplished. The section on light is done in more detail than is usually the case in books of this range, and in the section on magnetism and electricity there are many paragraphs which clear up difficulties in a manner which should appeal to the often puzzled student. For example, the chapter on magnetic measurements and that on electrical resistance will be really useful to many reading physics with whatever aim, for undoubtedly the phenomena described are, even when laboratory work goes hand in hand with reading, obscure to the early worker. This is a good little text-book.

SPECIAL CYTOLOGY.

Edited by EDMUND V. COWDRY, Ph.D., the Rockefeller Institute for Medical Research. New York: Paul B. Hoeber; London: Humphrey Milford, Oxford University Press. 1928. 2 vols. Pp. 1348. 693 illustrations. 94*s*. 6*d*.

Handbook of Microscopical Technique. Edited by C. E. MCCLUNG, Ph.D., Professor of Zoology and Director of Zoological Laboratory, University of Pennsylvania. Same publishers. 1929. Pp. 495. 36*s*.

THE work on Special Cytology is supplementary to the earlier volume on General Cytology published under the same editorship by the University of Chicago Press in 1924, and the series is completed by the volume on technique under the general editorship of Prof. C. E. McClung. The custom of coöperative publications is more and more coming into fashion, and it is one for which we have nothing but praise. It is still possible for a single individual to write a biological or medical text book of a general or elementary nature, but a more ambitious work on any particular subject demands a breadth of knowledge and a grip of detail such as few men possess. A book written by many authors may lack cohesion and unity, and that imprint of personality which made many of the older text books really great. But it has the overwhelming advantage that each section is written by a specialist who has a first-hand knowledge of his subject, and is content to deal with that subject only.

No less than thirty-five authors contribute to the two volumes on Special Cytology, and differentiation is carried to such length that, for example, in the chapters dealing with the nervous system one contributor is responsible for the internal architecture of the nerve cell, another for the general relation of histological character to function in mammalian neurons, another for the sympathetic nerve cell, another for the neuroglia and microglia, and another for the cytology of the cerebro spinal pathway. Under these circumstances a single reviewer may be excused if he refrains from any attempt at detailed criticism and restricts himself to a general survey.

These volumes should be invaluable, not only to cytologists, but to workers on biology and medicine. It is all the more to be regretted, therefore, that it is necessary to publish them at a price which must be prohibitive to many laboratory workers. There are, it is true, a large number of illustrations, but many of them are copied from other works, and there are only two coloured plates. And while most of the illustrations are good, some are quite unworthy. For example, the 41 figures of the myeloblast, following p. 396, are of little or no value, though no doubt the authors' original coloured drawings, of which they are photographs, adequately fulfilled their purpose. Figs. 92 and 93 stand out as glaringly bad and old-fashioned, and some of the figures illustrating the chapter on the thyroid are unpardonable in a work of this class.

Perhaps the most striking impression the book makes is that cytology is a really vital and progressive science; it rests, of course, on an anatomical basis, but its trend is essentially physiological. Then, again, the breadth and ramifications of cytology are revealed in such a manner as to make it abundantly clear that it is very far from being, as many believe, a narrow and academic subject; and this, in spite of the restrictions which considerations of space made necessary. Attention is directed chiefly to those cells which make up the human body; animal forms below the mammalia are not specifically dealt with. Again, the work contains but little embryology, but on the other hand pathology is freely drawn upon when it throws light, as it so often does, on the normal. And each chapter contains an abundant bibliography, the better for being selected.

While not designed primarily for the medical worker, Prof. McClung's contribution to the series should prove valuable to those engaged in histological research. It differs from most handbooks of its kind in that attention is given to the principles underlying the making of microscopical preparations. The sections devoted to the examination of fresh material and to microdissection and injection are admirable, and the selection of typical staining methods judicious. Dr. Robert Chambers here deals with a subject which he has made peculiarly his own, and supplies excellent figures to illustrate the technique employed. In certain respects the work is not so profound and detailed as might have been expected. The section on fixation and fixatives is elementary and not particularly helpful; and in the troublesome subject of decalcification, the pathological histologist will find little assistance. A relatively large amount of space is devoted to the histological study of the blood, and in this section are included procedures, such as methods of determining hæmoglobin percentage, which scarcely come into the scope of a manual of microscopic technique. On the whole, however, this is one of the most valuable books of its kind to be published for many years; it should run into many editions. As a worker in histology grows more experienced, he will find that by following the principles set out in this handbook he will obtain such a grasp of microscopical technique that he can adapt it to his special needs, instead of planning his work on conventional lines.

NERVOUS AND MENTAL DISEASES FOR NURSES.

By IRVING J. SANDS, M.D., Associate in Neurology, Columbia University, New York. London and Philadelphia: W. B. Saunders Company, Ltd. Pp. 239. Illustrated. 8*s*.

THIS small book is well-planned and readable, and though intended for nurses will be found useful by students and those starting on mental hospital work as junior medical officers. The chapter on medical psychology is particularly good, though one may question whether manipulative and play instincts should be considered as instincts or more correctly as elaborations of instincts. The description of conditioned reflexes and conditioned emotional

reactions and their relative importance in training and in the prevention of illness is informative. The account of the neurotic personality is hardly adequate, the hysteric type alone being described. The description of encephalitis lethargica and its after-effect is good, but it is not made clear that the anti-social reactions occur most commonly when the acute disease attacks children and adolescents. The author is unduly optimistic as to the prevention of general paralysis of the insane by early treatment of syphilis.

Dementia præcox is here classed among psychogenic disorders, the alleged endocrine and neurological changes being ignored. Among the excellent suggestions for treatment is one of "beauty parlours" to train patients in care of their personal appearance, though we hardly expect to see these instituted in our own hospitals. More space might usefully be given to general paralysis, while the sections on other organic psychoses could be curtailed, and also the elaboration of differently caused toxic psychoses. Drug addiction may be regarded as an expression of compulsion neurosis in many cases, but this is not suggested in the otherwise adequate account given of this. If the book is to be widely used in England a section as to our recognised means of mechanical restraint, which differ from those described, and the legal precautions in using them and seclusion, should be added; and modes of certification and limitations in treatment of patients as voluntary boarders also deserve some space, though, perhaps, not much.

For nurses, the chapter on special nursing procedures at the end should be supplemented by another on general nursing for mental and nervous patients, giving information about emergencies such as suicidal attempts, poisoning, and special precautions as to windows and fires. At present these instructions and also directions about feeding, prevention of bedsores, and care of the bladder are scattered amidst the descriptions of special types of illness and unnecessarily repeated. More emphasis should be laid on care as to feeding in general paralysis, and the importance in epilepsy of observing carefully not only the actual fits but prodromal signs and epileptic equivalents.

The book, however, gives a sound survey of the essential features of mental disorders and of the efforts being made to relieve and restore the afflicted to health.

SOME PRINCIPLES OF MINOR SURGERY.

By ZACHARY COPE, M.S., M.D. Lond., F.R.C.S. Eng., Surgeon to St. Mary's Hospital and to the Bolingbroke Hospital. London: Humphrey Milford, Oxford University Press. 1929. Pp. 159. 10*s.* 6*d.*

THE author does not attempt to cover the wide field of minor surgery as a whole, but limits himself to certain fundamental principles, which while elementary are yet of everyday importance. In the first chapter on the use and abuse of antiseptics, the lessons of the war are well summarised. In the consideration given to Dakin's solution, however, we could find no mention of its all-important property of dissolving dead protein material, although the value of clearing a wound of all dead material as a means of sterilising it is fully recognised. Maggots, those admirable scavengers to whom many wounded soldiers owe their lives, have a similar action. In the chapter on the treatment of acute inflammation, admirable on the whole, the author shows undue optimism about the benefit to be expected from vaccines. We find no mention of mercurochrome in this section. The superposed pictures in the chapter on infections in the hand make the text easy to follow. Much industrial disability follows such infections, and is far too often increased by ill-conceived treatment; this chapter is thus of great value to the practitioner. In the section on common sprains more stress might be put on the place of manipulation in treatment. The teaching of minor surgery to medical students is too often left in very junior hands, and the practitioner may never have had the opportunity of studying the principles on which routine procedures are based. These Mr. Cope has presented in a concise and practical form.

LE SYNDROME EPILÉPSIE.

By O. CROUZON, Médecin de la Salpêtrière. Paris: Gaston Doin et Cie. 1929. Pp. 264. Fr.55.

Dr. Crouzon's volume on epilepsy is erudite and comprehensive, yet its perusal leaves a slight sense of disappointment. Filled with an amazing number of facts of observation culled from all kinds of sources, ancient and modern, it seems to fail in the personal element; the reader is neither provided with critical summaries by the author nor apparently with any expression of his own views, based on what must be a wide clinical experience. The ground covered includes everything from the epileptic aura to the social reactions of the patient; the arrangement of material and lucidity of description leave nothing to be desired. But through this literary labyrinth we need guidance; we want the salient features emphasised and the non-essentials put on one side, and we are left to do this for ourselves. A minor note of remonstrance is called for; while numerous references are given a locus in journal or society proceedings, very many more are restricted to the writer's name, and some of these are clearly of importance.

L'ENCÉPHALITE EPIDÉMIQUE: SES ORIGINES:

Les 64 premières observations connues. By Dr. RÉNÉ CRUCHET, Professor in the Faculty of Medicine of Bordeaux. Paris: Gaston Doin et Cie. 1929. Pp. 133. Fr.15.

IN the spring of 1917 Dr. Réné Cruchet communicated to the Medical Society of the Paris Hospitals a paper describing some 40 cases of sub-acute encephalomyelitis which had been under his observation from towards the end of 1915 to the earlier months of 1916, almost entirely among military subjects, and again later in 1916–17 in another region. This little volume contains a detailed account of the cases and a reasoned claim that they belong to the class now commonly termed epidemic or lethargic encephalitis; the argument is perhaps supported by the fact that one of them, seen in December, 1916, later developed the bradykinetic syndrome and is declared to be one of parkinsonism. The remarkable clinical variety and heterogeneousness of the pictures presented by these cases are well illustrated; the author saw the condition evolve in mental, meningeal, convulsive, choreic, hemiplegia, cerebellar, pontine, spinal, and polyneuritic form. Handicapped as he was by the circumstances of the time, it is remarkable that he was able to make as careful an investigation as he did, even if details of a confirmatory kind are sometimes lacking.

Whether this encephalomyelitis of 1915-16-17 was and is a "new" disease is another question.

SINUS THROMBOPHLEBITIS.

By ALFRED BRAUN, M.D., Attending Otolaryngologist, Hospital for Joint Diseases, New York. With 111 illustrations. London: Humphrey Milford, Oxford University Press. 1929. Pp. 269. £2 12*s.* 6*d.*

A beautifully illustrated monograph on the inflammatory affections of the venous sinuses in the dura has for its central thesis the tracing of general sepsis of otitic origin. Sometimes glaringly obvious, at others slight, hidden and elusive, otitis is, mainly for anatomical reasons, a sinister cranial mischief-maker out of proportion to its degree or extent. Accordingly, the reader is introduced, in a section occupying rather less than one half of the book, to a complete anatomical description of vascular mechanisms in connexion with the ear and their immediate and distant relationships. The book is essentially an atlas, for the drawings and diagrams are on a generous scale and the text does

little more than comment on their significant features. The physiology of the dural venous sinuses, and the way in which the venous blood-flow is protected from the aspiratory effects of inspiration is elucidated. Next in order are treated the etiology and pathology of sinus phlebitis, and its semiology and diagnosis; an excellent résumé of the most modern therapeutic technique is furnished in a final chapter of some 60 pages. Among useful practical matter is the description of the Queckenstedt phenomenon as adopted for diagnosis of unilateral sinus thrombosis; the account of the neural complications of the condition is in some respects inadequate (for instance, that of the syndrome of the superior longitudinal sinus), and the data (clinical and spinal fluid) for differentiation from meningitis. The bibliographical references are largely confined to German and American sources.

TRIAL OF JEAN PIERRE VAQUIER.

Edited by R. H. BLUNDELL and R. E. SEATON, Barristers-at-law. Notable British Trials. Edinburgh and London: Wm. Hodge and Co. 1929. Pp. 208. 10*s.* 6*d.*

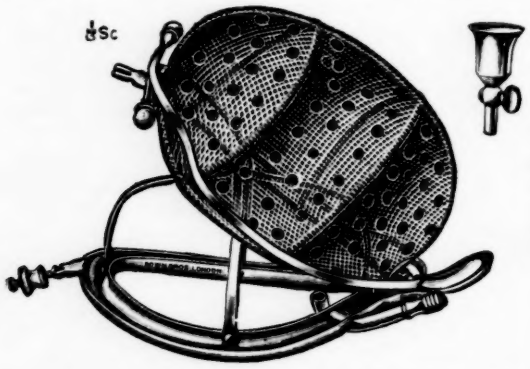
THE evidence upon a charge of poisoning, "of all forms of death the most detestable," is usually circumstantial, not direct. In Vaquier's case it was overwhelming. He became intimate with an Englishwoman, Mrs. Jones, who came to Biarritz for a holiday early in 1904. He followed her home to the Blue Anchor Hotel, Byfleet, which she managed with her husband. Mr. Jones used to take bromo salts (kept in a bottle on the bar-parlour mantelpiece) on the morning after his carouses. One Saturday morning he took his usual dose, complained of its bitter taste, went into convulsions, and died. His medical attendant, Dr. F. C. Carle, diagnosed recent strychnine poisoning, and with great promptness took possession of the bottle of salts, glass and spoon used by the dead man; he also discovered some spilt crystals on the bar-parlour floor. All these articles were eventually found to contain traces of strychnine, and the evidence of Sir Bernard Spilsbury and Mr. John Webster left no doubt of the cause of death. Vaquier, who had been early in the bar-parlour that day, had bought strychnine in London "for wireless experiments"; while in prison he revealed the hiding-place of a further supply of the poison in a toolshed in the hotel garden. He tried to implicate a mysterious third party, and the main feature of his defence was a vigorous attack on the credibility of Mrs. Jones; but there was no doubt of the verdict, and he was hanged in April, only a few months after he first met her.

The editors' introduction is workmanlike and wholly satisfactory; there is no straining after dramatic effect. The main medico-legal interest lies in the comparison of the knowledge, confidence, and precision of modern experts with that of the scientific witnesses in a case of strychnine poisoning such as the Rugeley trial some 70 years earlier. Fitzjames Stephen, who was present during most of the latter trial, gave a contemporary exposition of the effect of the expert evidence against Palmer in his "General View of the Criminal Law of England," a book still well worth studying.

New Inventions.

ETHER INHALER.

THE ether inhaler here illustrated has for its basis the principle of a vapour space which is obtained by superimposing an outer wire gauze cage on a Schimmelbusch face-piece. The gauze is perforated at short intervals, and when in use is covered with one or two layers of lint held in position by a spring. The outer



cage when clipped down holds the face-piece lint in position, and ether is introduced by a small funnel through the perforations in the gauze. A feed pipe is fixed near one end of the face-piece through which oxygen or oxygen and ether vapour can be introduced under the mask. The cage is so constructed that it can be completely removed, and the mask used as an ordinary Schimmelbusch by fixing a wire retaining-ring in its place. When in use anæsthesia can be maintained either by blowing a slow stream of oxygen through ether into the mask through the feed pipe, the proportions of ether and oxygen being ideally maintained by such an apparatus as Mennell's bottle and by-pass, or by gently dripping ether through the gauze by the funnel. In all cases it is advantageous to use oxygen while maintaining anæsthesia. By adding an extra layer of lint to the cage or by covering with a layer of gamgee the anæsthesia can be deepened at will.

Among the advantages of this inhaler are ease and uniformity of anæsthesia, clear view of the face during anæsthesia, and economy in use.

I would like to thank Dr. Z. Mennell, senior visiting anæsthetist, and Dr. G. Edwards, senior resident anæsthetist, of St. Thomas's Hospital, for testing the inhaler and for their very helpful suggestions. The mask is made by Messrs. Down Bros., Ltd., St. Thomas's-street, London, S.E.

Bedford. G. A. METCALFE, M.B., B.Ch.

SKIN FORCEPS.

THE approximating forceps for the skin designed by the late Mr. C. P Childe, of Portsmouth, is of great assistance in avoiding the in-turning of skin edges during suture when completing an operation, but needs the use of one hand in holding the ends together while the stitch is tied. In order to free this hand and so make for increased rapidity in suturing, this forceps has been modified by reversing the spring action so that when the finger grip is released the ends remain in apposition. A certain amount of practice is necessary to get accustomed to the reversed action of the spring, but it will be found that the modified instrument does help in producing a neat and therefore quick-healing scar.

The instrument has been made for me by Messrs. Allen and Hanburys, of Wigmore-street, London.

A. W. HOLTHUSEN, M.B., B.S. Lond.

THE LANCET.

LONDON: SATURDAY, AUGUST 10, 1929.

THE BACTERIOPHAGE AND THE CURE OF DYSENTERY.

EVER since the dawn of the bacteriological era it has been the therapeutic ideal of all who have accepted the germ theory of disease to acquire some means whereby the specific micro-organisms might be destroyed or disarmed and the healthy tissues left unaffected. Innumerable agents have been on their trial, from the crude antiseptics of early days, through the biological antibodies of a later period, to the modern chemotherapeutic stage. All along this steady course of trial and progress may be seen landmarks which indicate certain notable measures of success; some clear and towering, rising erect against the winds of controversy and the corroding influence of time—such as diphtheria antitoxin, the vaccine virus, and salvarsan; others more inchoate, denoting an area whose limits are not yet demarcated—such as the benzidine group of dyes to which the modern trypanosomicidal drugs belong. One agent stands unique amongst these varied bactericidal substances—the bacteriophage described by TWORT and D'HERELLE. It is unique because so little is known of its nature, whilst its effect in the body as a therapeutic agent is still disputed.

The view of this substance, which at our present stage of knowledge seems most rational, is to regard it as akin to the filterable viruses, and as such its study may well lead to important advances in our knowledge of the latter, since it is an agent easily detected and handled and readily submitted to all forms of experimentation. The actively destructive effect of the bacteriophage upon sensitive bacteria is indubitable, and can be readily observed both with the naked eye in mass cultures and under the microscope upon the individual organism. It would therefore seem, upon a priori grounds, that it should constitute an ideal agent for an attack upon micro-organisms in the body, and especially upon those which act upon the surface of the intestine and pullulate in the intestinal canal. In one respect only are inherent difficulties apparent. These lie in the circumstance that when complete destruction of the organisms is not effected, resistant strains of bacteria may develop, which present an interesting analogy to the drug-fast strains of protozoa which have been such a constant source of difficulty in the chemotherapeusis of protozoal infections. What is the exact factor determining the resistance which bacteria may develop against a given phage is at present unknown. It has been widely assumed, and with a good deal of supporting evidence, that it represents a variation in the antigenic constitution of the organisms, in the technical language of the bacteriologist a variation in the "rough" direction. This variation can be brought about by other environmental conditions and may in this instance be produced by the bacteriophage. This is the view adopted in general by HADLEY.[1] However, L. M. BURNETT[2] in a recent paper, has adduced evidence that in the acquisition of resistance no observable serological changes in constitution may take place, the only notable effect being the loss of the resistant bacteria of the ability to adsorb the specific phage in question.

With regard to the clinical problems, which are of more general interest, we publish on p. 273 a contribution by Dr. A. COMPTON to the study of the therapeutic value of the bacteriophage in bacillary dysentery. About this value conflicting reports have been issued, many of which have been noticed in our columns from time to time. Of all diseases those of the intestinal group should be most amenable to treatment by this means, and it may be recalled that it was in connexion with dysentery that D'HERELLE made his initial claims for the practical therapeutic use of the bacteriophage. In general, these claims have been not confirmed, although in a recent communication[3] D'HERELLE announces that "the method has been applied in tens of thousands of cases of bacillary dysentery and recovery always took place in 24 hours." We are not aware that the collected details of such cases have ever been published. Dr. COMPTON bases his report upon 66 cases of Egyptian dysentery which had been diagnosed "cytologically" as of bacillary origin. The type of infection is stated to have been predominantly of the Hiss variety, and the bacteriophage in use a polyvalent strain including one variety of D'HERELLE'S own isolation and apparently of high potency. The cases were not observed directly, but were under the control of outside doctors. If we examine the reported results initially, we find a maximum beneficial effect to have been obtained in 35 out of 66—i.e., just over 50 per cent. The criterion adopted is the diminution in the number of stools, which fell to 2 to 3 per day on the second day of treatment, and (presumably) uninterrupted recovery thereafter. The ordinary saline treatment was carried on coincidently with the specific measures. Such a result, taken at its face value, appears to be excellent, but it is a constantly recurring lesson in medicine that face value results are not always safe guides to the value of medicaments. Only rigidly controlled parallel series of treated and non-treated cases will give information of real and lasting value. Dysentery is by no means always a serious and progressive malady. Anyone who has had experience of a considerable epidemic of it knows that in many cases the infection may be self-limiting and recovery may occur without any specific treatment. It is not suggested that a large proportion of Dr. COMPTON'S treated cases are likely to have been in this category, but the possibility represents an interfering factor, whose extent it is not easy to estimate. The treatment did not appear to affect the well-known influence of age as a prognostic factor in this disease. Phage or no phage, the younger the patient the greater the mortality. There is still lacking a sufficient and clearly cut investigation of this important question which will enable us to judge of the value of the bacteriophage in dysentery. The usual criticism of negative results, that the strain of phage was not of maximum virulence, is a weighty one which cannot be disregarded. Since the evidence of the value of this treatment is anyhow not so convincing as to make it inhuman to withhold it from any sufferer, it would be a real service to therapeutics if those who, like Dr. COMPTON, have access to an unlimited number of cases of bacillary dysentery would treat alternate

[1] Hadley: Jour. Infect. Dis., 1928, xlii., 265.
[2] Burnett: Jour. Path. and Bact., 1929, xxxii., 349.
[3] d'Herelle: New Eng. Jour. of Med., Feb. 21st, 1929.

cases with the bacteriophage and the others by any one of the approval methods, giving in each case a detailed bacteriological examination before and during treatment and chronicalling the clinical course. Only by such an investigation can the question be solved which ten years of scattered observations and uncontrolled reports, suggestive though they may be, have still left unanswered.

THE EPIDEMIOLOGY OF MEASLES.

SINCE cholera, small-pox, and virulent scarlet fever became negligible factors of exanthematic child mortality, measles has been a prime object of concern to the health departments, sharing precedence with whooping-cough and diphtheria. The epidemiologist has been preoccupied by its curious manifestations for even longer. When a locality is hit by one of the periodical waves of measles the child population is always extensively involved, and the evolution of each outbreak is not influenced by any counter measures which have hitherto been tried. The illuminating studies of mass infection and immunity which have resulted from bacteriological and immunological discoveries in diphtheria and scarlet fever have left the epidemiology of measles no further advanced. Almost the only method of investigation open to us in measles is the statistical one which, though it can achieve little unaided, can be invoked to confirm or refute laws framed on other evidence. We welcome, therefore, an attempt to explain the well-known phenomena of the epidemicity of measles by the theories of "latent epidemisation" and "latent immunisation"[1] made in a recent study by Dr. PERCY STOCKS and Miss MARY KARN.[2] To this end a most elaborate procedure has been adopted. The detailed records of all cases of measles notified in the metropolitan borough of St. Pancras during three years from March, 1924, to March, 1927, have been studied, as well as the statistics of deaths and notifications since 1916. The living population at each age under 12 in St. Pancras at the beginning of the three years' period was estimated by applying the ascertained births and deaths to the census data, and the number of children at each age under 10 who could be regarded as definitely immune from recognised measles was ascertained from the statistics of notifications from 1916 to 1924. By laborious adjustment it was possible to estimate at any one time during the three years' period the separate numbers in two groups—viz., those who had already been familially exposed to measles during the period (the selected population), and those who had not (the residual population)—and to divide the former into those who manifested immunity after the lapse of varying periods of time and those who did not. Investigation of the true infectivity of the virus, as distinct from its apparent infecting power, and also the relation of this quality to different meteorological conditions, were attempted.

The conclusions arrived at are as follows: (1) The epidemic phenomena of measles are inexplicable if experience of an attack of recognisable measles is the only way of acquiring immunity; (2) a study of the incidence of measles at different times in the selected population, as compared with the residual population, shows that individuals in the former group acquire, without manifest sickness, a degree of immunity in excess of that exhibited in the latter and tending to diminish with the lapse of time—probably vanishing in most cases within two years; (3) this accounts for the observed fact that many children assumed to have no acquired immunity go through an epidemic without sickening, and it may explain the biennial periodicity of the disease; (4) the retardation of spread from the later foci of an outbreak, as compared with those at the onset, may also be explained by latent immunisation; (5) the *apparent* infectiousness of measles varies from a maximum at the onset of an epidemic, falling throughout its evolution to a minimum at the end, gradually increasing again in the course of the non-epidemic interval; (6) "all the changes noted in apparent infectiousness are explicable by immunity changes alone, excepting the *sudden* fluctuations, which must be attributed to changes in facility of transmission," such sudden fluctuations occurring mostly at the commencement of large epidemics; (7) the curve of the epidemic can be almost completely explained "by the concept of an active plus latent immunisation of the child population on the one hand, and changes in facility of transmission of the virus by droplet infection from cases or carriers to other persons coming in contact with them on the other," the latter phenomenon being possibly related to certain atmospheric states.

It will be seen that Dr. STOCKS and his collaborator have succeeded in applying to the behaviour of measles the laws for which bacteriological and immunological support can be adduced in other communicable diseases. Confirmation of the investigation is not likely to be forthcoming at any near date because of the labour involved, the statistical skill required, and the paucity of data available. Incidentally it may be noted that an inquiry of this kind might have been even more fruitful in a more sparsely populated area, such as Renfrewshire, where measles was notifiable and carefully carded for more than 20 years, and where extra-domiciliary infection was proved to be much rarer in villages than in towns. A test that may be applied immediately, however, is the experience of practical workers in the field of the communicable diseases. Is there even circumstantial evidence of the carrier state or of anomalous forms of measles, comparable with that which can be adduced to support the theory of latent epidemisation and immunisation in other zymotics, whether of known or unknown origin? It must be confessed that there is very little. When inquiries are pressed they rarely fail to trace measles to another recognisable, if unrecognised, case. Only very occasionally does one see the crossing of a ward, for instance, by a child with coryza, Koplik's spots, and no more than a slight blotchiness behind the ears or down the side of the neck, in contrast with the experience in relation to diphtheria and scarlet fever. It is, of course, possible to argue that the signs of anomalous measles resemble so closely those of catarrh of any other origin that the infection is likely to escape diagnosis until a specific test is devised, but if this were so measles should be much less easily traceable than it is. If, then, latent infection occurs, it is without demonstrable association with modified forms of the disease. On the other hand, the general behaviour of epidemics of measles, noted by the late Dr. JOHN BROWNLEE fits well with the new hypothesis, as does the phenomenon of apparent non-infectiousness in hospital wards during inter-epidemic periods mentioned by the same observer. Dr. STOCKS and Miss KARN have produced what is in many respects the most valuable contribution to the study of measles which has appeared since BROWNLEE'S ingenious, if rather fanciful, work on the periodogram.

[1] See THE LANCET, 1928, ii., 233.

[2] A Study of the Epidemiology of Measles. Annals of Eugenics, vol. iii., Parts iii. and iv., October, 1928.

THE CORONER'S DISCRETION.

WHEN Parliament three years ago enacted that every coroner should be paid by salary instead of by fees, it was hinted that the fee system had been a possible inducement to coroners to multiply inquests. In introducing the Bill which effected the change, Lord CAVE expressed the opinion that the suggestion was unfounded. In any case the change in the law was welcome. The Chalmers Committee's report, issued in 1910, observed that a coroner had often more trouble over holding a preliminary inquiry than over the actual inquest; if he satisfied himself that there was no public ground for holding an inquest and thereby saved unnecessary pain and distress to relations of the deceased and expense to the community, it was rather unfair that he should, so to speak, be fined for his good conduct; "it is not right," added the report, "to put a coroner (and still less his officer) in the position of having a pecuniary motive for holding unnecessary inquests." The desired reform—in the Coroners (Amendment) Act of 1926—gave the coroner a statutory encouragement and authority to dispense with inquests. Already the critics are asking whether inquests are not now too few.

Statistics are here more than usually inconclusive. The latest available from the Home Office deal with the year 1927 and so cover only a few months of the operation of the Act of 1926. In 1927 there were 60,511 deaths reported to the coroner; 12,108 of these were deaths of lunatics and mental defectives in nstitutions. In only 345 of these institution cases was an inquest held, but, in view of the medical information no doubt available as to the condition of the patients, the small proportion of inquests is easily understood. Against the total of 60,511 deaths reported to the coroner in 1927 we have the figure of 32,439 inquests held. For what the comparison may be worth, we can look back at the figures a few years ago. For 1924, for example, the corresponding totals of deaths reported and inquests held were 53,062 and 31,705. In the past few years, it seems, the number of inquests has remained fairly stationary while the number of deaths reported has considerably increased. It would be most unsafe to dogmatise upon such material; local variations are due to accident and to the varying exercise of the individual coroner's discretion. The 1927 tables show that in one jurisdiction a coroner happened to hold an inquest in every case of death reported to him, while, in the same period, a coroner in another jurisdiction was content to hold only one inquest for every five such deaths. These differences are inevitable. They were noted by the Chalmers Committee in 1910 when it was found that in one part of London the percentage of inquests to deaths reported was 59 while in another it was 81. It has probably been the experience of many general practitioners that on occasions when they regarded an inquest as unnecessary an inquest was nevertheless held; conversely, when, so far as is within their power, they have indicated the desirability of clearing up some puzzling or suspicious symptom, the coroner has dispensed with a formal inquisition. The coroner's decision not to hold an inquest is an act of executive rather than judicial discretion; the exercise of such discretion, conducted in private rather than in public, may find critics; it can at least be hoped that there will be the maximum of agreement between the coroner and the medical practitioner. The 1926 Act and the 1927 Regulations, which the late Sir George Greenwood and his supporters thought so inadequate a protection against either foul play or premature burial, vastly improved the old method of reporting suspicious cases to the coroner. The new system, involving perfect confidence between coroner and practitioner, is on its trial. The public, puzzled by recent exhumations of bodies and reopenings of inquests for which neither coroner nor practitioner is in any way to blame, may feel vague misgivings as to the modern working of an ancient tribunal. If at any time it were disclosed in some sensational case that the coroner had neglected or undervalued the practitioner's warning, Parliament might be pressed to limit the discretion which it conceded in 1926.

Annotations.

"Ne quid nimis."

THE EXPERIMENTAL METHOD IN PSYCHOLOGY.

IT is the fate of any science which has one hand on the human heart and the other on the laboratory instrument to promise more than it can give in respect to the problem of mind. The extraordinary achievements of the scientific method in the field of physics and chemistry promised equally glittering prizes to those who entered the lists of psychology with stout hearts and sharp instruments. With the aid of physiology, psychology has now definitely emancipated itself from metaphysics, and has sought to adopt methods comparable to those used in the study of physiology of the special senses, where a local problem can be, to some extent, isolated. Where the reactions of the whole organism are involved, however, dealing with a problem in a circumscribed or local way becomes impossible. It is to this difficulty in experimental psychology that Mr. F. C. Bartlett devoted his Presidential address, delivered in Cape Town on July 26th to the Psychological Section of the British Association. He has endeavoured in a historical survey to show that such idols in the temple of psychology as G. T. Fechner and H. Ebbinghaus have in reality not served their science too well in stressing the great importance of the stimulus in the reactivity of the organism. In the study of pure sensory experience, if such experience can be divorced from all others, the relationship of stimulus, however simple to response, can be studied with the hope of realising simple dogmatic laws. But no sooner do the processes studied leave the field of simple sensibility and begin to involve more complex functions and the attitudes of the organism as a whole, than the qualifications limiting results grow alarmingly and the method exhibits its shortcomings. In such complex "sets" the stimulus does not entirely govern the response, but merely acts as a trigger mechanism setting free propensities and activating large psychological systems or attitudes. The fault lies in the attempt on the part of the experimental method to study the organism too much away from the context of ordinary biological situations. The nonsense syllable method for the study of memory and retentiveness is a convenient example. In most, if not in all living situations, the stimulus is but a fraction of a total system of vectors. Mr. Bartlett notes that the physiologist "rightly lays the chief emphasis upon the local response mechanism, and for obvious reasons shrinks from speculations about the central processes until he knows as much as can be learnt about the peripheral functions and their mode of operation." But since it is these central processes that are the primary concern of the psychologist, the latter can learn little by the study of the peripheral events and can safely leave them to the neurologist.

Strangely enough, as Mr. Bartlett acutely observes, the very protagonists of the experimental method are the persons most prone to commit the error of what may be called unbridled "a priorism" in claiming more for the method than it can with its limitations produce. The theory of Gestalten, the Spearman theory of two factors, Jaensch's deductions on character from his experiments on "Eidetic Images," and lastly the easy acceptance of the conditioned reflex as the new panacea, are examples of the dangers of attempting to stretch the experimental method to cover the whole field of the mental life. Behaviourism, and the conditioned reflex which has become the irreducible unit of this valuable experimental approach to behaviour, are illustrations of the

dangerous consequence of the absence of logical scrutiny at all stages in the development of a new approach. So far has the enthusiasm for the conditioned reflex gone that Pavlov himself speaks of "search reflexes." Could the mixture of logical categories go further?

Psychology must concern itself with the highest reactions of the organism as a whole, and must in consequence take account not merely of the stimulus and the final response, but the whole of an organism historically determined, and at all times and at all points saturated with affect and governed by those complex methods of adjustment and growth which we term the instincts. In short, if psychology is to retain the respect of the humanist, it must pursue to some extent the clinical method. Much therefore can be added to academic psychology if it allies itself to psychopathology. It is in this field that the processes of fragmentation are best studied, since they come into being in response to some strange biological necessity. The molecular method can be pursued by those who prefer the artificial atmosphere of the laboratory, but for psychological workers. Nature provides suitable material nearer at hand.

THE PATHOLOGY OF GASTRITIS.

CONCEPTIONS of gastritis have altered a great deal in the last few years. The older pathologists recognised the gross lesions caused by corrosives like carbolic acid and irritant poisons like alcohol, but the finer forms were lost in the changes produced by post-mortem degeneration and self-digestion of the stomach. In their study of pathology in the living, surgeons found ulcers and growths affecting the stomach, but gastritis as such was unsought for, and thus passed out of practical consideration. Further examination of the material obtained by resection of the stomach has, however, revealed changes in areas other than those invaded by growth or eroded by ulcer. The newer methods of investigation, especially histological observations on portions of the stomach fixed at body temperature, immediately after removal at operation, have thrown a new light on conditions of chronic gastritis. Konjetzny[1] found in such material that gastritis was present in every case of gastric ulcer examined, whilst in every case of duodenal ulcer there was gastritis as well as duodenitis. In 90 per cent. of stomachs resected for gross carcinoma he found evidences of gastritis in other parts of the stomach. Although Konjetzny believes that the gastritis is the cause of ulcer and of carcinoma, most workers see in these results at most the frequent association of gastritis with ulcer and cancer, and leave open the question whether the gastritis is primary or secondary. The great difficulty is that both gastritis and early carcinoma may be latent, and give no clinical evidence of their presence, so that microscopy is required to settle the question definitely. X rays may sometimes indicate gastritis by showing alterations in the contour of the mucous folds outlined by barium, but a negative result does not disprove its presence. It has long been recognised that inflammation of the lining of the stomach and duodenum may occur after severe burns on the skin, and lately F. Kauffmann[2] has investigated more exactly the importance of products of degenerated tissues in causing endogenous gastritis. In experiments on dogs he produced a dermatitis by sunlight treatment, and in other instances a sterile abscess by subcutaneous injection of turpentine. The sterile abscess or inflammation of the skin served as a source of the toxins derived from breaking down of proteins. The results observed were, besides degeneration in other organs (liver, kidney, and heart muscle), fatty degeneration of the gastric mucous membrane, especially in the pyloric region. A secondary inflammation in the submucosa was often found as well. All forms of degeneration were observed, from a simple fatty change or mucous catarrh to a severe erosive gastritis, implicating also the muscularis mucosæ and connective tissues of the submucosa. These inflammatory changes are brought about by the toxic products derived from protein degeneration in other parts of the body. Toxic or endogenous gastritis, he holds, may thus arise during infectious disease, or from the presence of inflammation in organs far removed from the stomach. A degenerating carcinoma in one part of the stomach may give rise to gastritis elsewhere in the organ. Bacterial toxins, which have hitherto been regarded as the essential causes of these lesions, may be found to play a less, though by no means negligible, part.

[1] Konjetzny, G. E.: Handbuch d. spez. pathol. Anatomie u. Histologie, Berlin, 1928, iv., ii., 892.

[2] Klin. Woch., 1929, viii., 1380.

THE AFTER-HISTORY OF ATHLETES

"It is not perhaps too confident a statement that a properly trained person, man or boy, need never fear cardiac strain." (Allbutt.)

THIS sentence expressed concisely the attitude of a large section of the medical profession in 1909 to the question of possible injury to health resulting from severe physical exercise. Since that time no facts have come to light which would render the statement invalid; on the contrary, such evidence as there is—part of it was discussed in our columns last month—all tends to confirm the belief expressed twenty years ago by Sir Clifford Allbutt. In view of the increasing number of persons of all ages who regularly take part in athletics, the subject will continue to arouse interest. Investigations are still being put in hand all over the world, and carried out mostly upon groups of men who have specially prepared themselves for some special (and short) period of exertion—for example, a University Boat Race or Olympic Games—and have been limited to an examination of the subjects shortly after the end of the contest. In the *American Journal of Medical Sciences* (July, 1929) an account is given by Dr. Burgess Gordon and the late Dr. J. C. Baker of some observations on a trans-continental foot-race. Such a race provides unusual opportunities for studying the reactions of the body to severe effort continued for a long time. It also provided in this case an opportunity for the study of the effects of daily severe effort upon the comparatively untrained as well as upon the trained subject. The entries numbered 199, the eldest being 64, the youngest 17. Examination before the race showed that about 50 per cent. were physically under-developed, 3 per cent. suffered from respiratory infections, 4½ per cent. showed gastro-intestinal symptoms, 8 per cent. showed albuminuria. During the race only 7 competitors dropped out on account of exhaustion; these were unfit at the start and were untrained. Only 57 finished the full distance. Those who retired did so for a variety of reasons. "Shin splints"—a form of myositis with periostitis in the anterior tibial region—together with financial difficulties accounted for most of the withdrawals. The total mileage was 3484, and the daily average 44·2 miles. At the finish only 14 showed signs of fatigue; all the others were in excellent health. A careful physical examination carried out three days after the race showed no cardiovascular abnormalities. A striking fact is that 65 per cent. of those examined suffered from tonsillitis. Twelve months after the finish of the race inquiries were made as to the condition of the competitors; all the replies indicated that so far from being injured, they felt themselves to have benefited from the race. It is, of course, too early to judge of the effects of such a sustained severe effort on the health of the competitors, and it is to be hoped that careful records will be kept of the later history of those who took part in the race to add to those now available. We have already referred to the study by Morgan of the lives of University oarsmen (1829–69), and to his conclusion that the deaths definitely due to cardiovascular causes were in exactly the same proportion

as in the general population. Meylan, who investigated the history of Harvard oarsmen, came to similar conclusions. R. W. Michell, of Cambridge, who examined 1200 rowing men and 410 players of Rugby football, found cardiac dilatation which persisted after exercise only in men with a history of either diphtheria or rheumatic fever, who had taken strenuous exercise while untrained. It is clear that on physical grounds no objection can be made to a habit of life which involves strenuous exercise, provided the individual is physically sound and properly trained. The available evidence is almost entirely confined to men, but there is no reason to doubt that it would be confirmed by investigations of the after life of women athletes. The various federated associations concerned with promoting sporting events for women in France have instituted a medical service and propose to insist on a certificate of fitness before candidates are allowed to enter for any event; this precaution, if followed up, might well form the basis of valuable statistical information. The efforts made to collect evidence to prove that exercise does no physically observable harm is a sign of the conviction, difficult to prove, but widely held, that a condition of trained physical efficiency not only leads to happiness and well-being, but goes hand in hand with general and especially mental efficiency.

OPTOCHIN IN OPHTHALMOLOGY.

CUPREINE is an alkaloid which occurs with quinine in cuprea bark, and the important property of ethylhydrocupreine is that it destroys pneumococci. It has been used medicinally in pneumonia, but it is mainly employed as the hydrochloride salt (optochin) in a one or two per cent. solution in eye affections, especially in pneumococcal ulcer of the cornea. Unfortunately its employment in this disease is attended by much pain. Dr. S. H. Browning, at the recent Oxford Ophthalmological Congress, suggested that it should not be applied direct to the cornea after it has become infected with the pneumococcus, but that the parasite should be attacked while it is still in the lacrymal sac, before the cornea has become infected. The popularity of optochin among ophthalmologists has suffered from its chemical name, for it is generally supposed that it is a derivative of copper and is therefore a dangerous substance to use on the eye. In fact copper does not enter into its composition at all, and the patient may be assured that the pain caused by its application does not indicate damage to delicate tissues.

RENAL EXTRACTS IN THE TREATMENT OF NEPHRITIS.

THE outlook in chronic nephritis is, as a rule, so bad that anything which offers hope demands every consideration. The possibility of a new therapeutic approach was mentioned in an annotation in our columns not long ago,[1] when it was suggested that injections of phosphate may perhaps be found useful. We observe that another line of possible treatment is being explored by Prof. Stejskal of Vienna, who has published[2] a small series of cases of advanced renal disease in which injections of fresh extract of kidney were given. Organotherapy has been abused so often that attempts of this kind are naturally received with reserve; but Stejskal's idea is neither altogether new nor devoid of foundation. A similar experiment was made as long ago as 1892, by Dieulafoy, and the theory of an internal secretion of the kidneys dates back to Brown-Séquard. It has often been suggested that in contracted kidney broken-down renal parenchyma is absorbed into the blood, and that such products are responsible for the high blood pressure and other changes found in this condition; and investigation has in some respects confirmed this hypothesis. Goldzieher[3] and others, injecting emulsions of kidney substance subcutaneously into rabbits, produced albuminuria and casts in the urine, and sometimes death. At the same time the adrenal bodies were found to be markedly enlarged with an excessive hyperplasia of the medulla. These and other experiments led him to the view that resorption of diseased kidney tissue caused an over activity of the adrenal medulla which was an important factor in the rise of blood pressure in cases of contracted kidney. Much may be said for this opinion; thus we know that if serum from a nephritic patient is added to a solution of adrenalin the pressor effect of the latter is considerably increased. Again, it is possible to have a very high blood pressure without obvious nitrogen-retention, which is evidence against the alternative hypothesis that such retention is alone responsible for the hypertension. Possibly both factors are concerned in producing so-called interstitial nephritis; thus primary impairment of the function of the kidney may lead to resorption of diseased renal tissue, which increases the liberation of adrenalin, whilst the subsequent accumulation of nitrogenous waste products in the blood may cause stimulation of the sympathetic, which acts again upon the adrenal medulla. At all events, whatever may be the connexion between renal damage and hyperpiesis, Stejskal is able to record a remarkable reduction in blood pressure following injection of extracts of kidney. He used a sterile watery extract, containing as far as possible the unchanged renal lipoid bodies, but almost practically free from protein. This was injected in quantities of 2 to 5 c.cm. intradermally (so that absorption should be gradual) once or more into ten patients suffering from advanced contracted kidney, some in the late stages of uræmia itself. Injection was always followed by a fall in blood pressure, which was gradual and progressive, and in some cases this was persistent. This fall was not seen after injection of other tissue extracts and only occurred in cases of renal hypertension—that is to say, the renal extract appeared to be truly "organ-specific." The falls observed in the cases recorded were of 80, 40, 70, 120, 120, 90, 130, 90, 80, and 120 mm. of mercury—an average of approximately 100 mm. All were cases with very high values before the injection and obvious signs of terminal nephritis. Symptoms other than hypertension were not consistently affected, nor did the outcome of the disease seem to be much influenced, but the figures are certainly noteworthy. The theory is advanced that the fall may be due to some effect on the blood-vessels, perhaps of some hormone in the extract, which relaxes their powerful tonic contraction.

[1] THE LANCET, July 27th, p. 183.
[2] Stejskal, K.: Med. Klin, 1929, xxvii., 1015.
[3] Goldzieher, M.: The Adrenals. London, 1929, p. 223 et seq.

THE INDUSTRIAL HEALTH RESEARCH BOARD

THE change of title announced in its ninth annual report[4] by the Industrial Fatigue Research Board indicates that in future its object will be to study not merely the negative or pathological aspect of industrial activity, but also its positive side of promoting and maintaining good health. This step is in accord with the trend of modern medicine, for the doctor attempts to teach the patient how to be well and keep well, rather than to seek for cure of ills earned by wrong living. The body to be known as the Industrial Health Research Board came into existence to follow up war-time research into the evil effects of long hours and heavy work, but has now as its primary aim the acquisition of knowledge about conditions and methods of work most favourable to the workers. A glance at the variety of inquiries recently completed or in progress displays the wide scope of the Board's activities. Hours of work, the heating and ventilation of factories, vision and lighting in relation to output, the effects of noise

[4] Ninth Annual Report of the Industrial Health Research Board to Dec. 31st, 1928. H.M. Stationery Office. 1929.

and vibration, accident causation, labour turnover, repetitive work, vocational guidance and selection, sickness prevalence among printers, cardroom operatives and miners, humidity in mines, weight carrying, the physiology of exercise, the transfer of acquired skill, and the relation of age to the acquisition of dexterity, are all included among the subjects receiving consideration. Some activities concern problems of wide industrial importance; for others the material has been submitted by Government departments and industrial associations, while yet others are experimental researches carried out in laboratories. Knowledge is being gained; it remains to bring it to the attention of industry for practical application, for it should bring with it not only increase in health for the great working population, but increase in productive activity and wealth for the nation.

A notable example of the type of information made available by the publications of the Board is the report just published, dealing with monotony in work.[5] The investigation was made on workers employed on such repetitive processes as filament winding, soap wrapping, chocolate packing, and tobacco weighing. Boredom was found to be a fairly general experience; only about one quarter of the workers escaping it. Boredom was held to be responsible for reducing the rate of work by from 5 to 10 per cent., and was more prevalent when operatives were paid on a time-basis than on piece-rates. It caused irregularity in rate of work, and affected particularly workers of superior intelligence whose productive efficiency was above the average. Workers doing entirely automatic work did not suffer much from boredom, for their thoughts could safely be detached from work and directed to more interesting subjects; it will be remembered that Auguste Comte claimed that chances for philosophic thought lay in such occupations, and looked to find pupils among such operatives. Boredom occurred most in semi-automatic processes which require enough attention to prevent mind-wandering, but not enough for the complete absorption of mental activity. Continued exposure to monotonous work causes adaptation, so that what is initially tedious and unpleasant may finally be tolerated or even mildly enjoyed. The suggestion made in this report that, by completing the mechanisation of the task, boredom is avoided and thought stimulated is decidedly unexpected. On this assumption mass production by repetitive work, when carried to a fine art, would cure the very trouble it has always been accused of causing. Here is a problem, elusive and difficult of approach, wherein progress must necessarily be slow; but the theories now put forward are ready for practical trial.

THE EVOLUTION AND PURPOSE OF THE LARYNX.

SOME years ago Mr. V. E. Negus set himself the task of tracing the reasons for the existence of the larynx and the steps of its evolution in response to the many demands made upon it. He started upon his researches without preconceived ideas, and allowed them to follow the directions which seemed to be indicated by his attempts to correlate structure and function of this organ throughout the range of animal life. He has examined the anatomy and physiology of the larynx, with its associated organs, from its earliest inception in the lung-fishes, and on this study has founded theories which he expounds with good argument in a recent publication.[6] The superficial idea that the larynx is "the organ of the voice" is obviously untenable from the evolutionary point of view. The primitive larynx is a valve placed on the floor of the pharynx at the top of the pulmonary outgrowth to prevent water and food from entering the lung sac; in the most primitive forms it is surrounded by a muscular sphincter only, but in some lung-fishes dilator fibres are also present, and in the axolotl lateral cartilages have appeared with the function of keeping the valve open when air is entering the sac. From this point Mr. Negus traces the evolution of the larynx with a wealth of detail which is of absorbing interest. The nose is primarily intended for olfaction; in fish, with few exceptions, it does not communicate with the mouth, but in air-breathing animals it is necessary for olfaction that air should pass through the nose. In order to retain this passage of air while the mouth is open during eating the epiglottis has been developed, and all keen-scented animals have a big epiglottis lying normally in contact with a long soft palate. As a secondary function in many rapidly running animals the long epiglottis reaching into the nasopharynx is valuable for maintaining a straight and open air-way to the lungs. In many lowly animals the larynx is of a domed shape, a configuration which prevents the entrance of air except when muscular action provides an opening. Some of the higher animals possess secondary valvular folds formed by specialisation of the thyro-arytenoid muscle; these prevent the entrance of air with the minimum expenditure of muscular energy, and the best instances are to be found in arboreal animals, particularly actively climbing monkeys, and in the higher apes and man. Mr. Negus believes that the primary function of these valves is to hold the thorax rigid, and so to give a fixed point of origin to the pectoral muscles. These valvular folds, which are the vocal cords of man, we owe to our arboreal ancestry; they have been further developed by the specialised use of our fore-limbs, and their employment for speech is a secondary function. These theories and other matters relating to the forms and functions of the larynx throughout the animal kingdom are supported by careful observations minutely recorded. The book gives evidence of much specialised knowledge as well as of original thought, and will be of interest to biologists as well as medical men.

RETINAL ADAPTATION AND FLICKER.

THE fact that the sensation produced by a visual stimulus persists after the stimulus itself has come to an end has long been recognised. In 1765 D'Arcy made the first recorded attempt to measure the persistence of an image by the rate at which a burning stick had to be whirled before it would give an impression of a continuous circle of light. The modern method is to fix a rotating disk, with one or more sectors cut out, in front of a source of light and increase the speed of its revolution until the flickering impression gives way to a sensation of continuous light. A recent report to the Medical Research Council shows that appreciation of rapid stimuli varies in different regions of the retina and is dependent on the condition of adaptation of the eye. To produce the sensation of flicker the subject being experimented on is seated in a cubical box with a minute window through which he can view a test patch, either directly (foveal vision) or at an angle (peripheral vision); the sectored disk is then made to rotate in front of a gas-filled lamp. The number of interruptions per second necessary to do away with flicker is known as its "critical frequency" and this varies according to the state of adaptation of the eye, according to the region of the retina on which the light falls, and according to the illumination of the test patch and its surroundings. During dark adaptation with high illumination of the test patch the critical frequency falls With low illumination of the test patch for the peripheral retina the critical

[5] The Effects of Monotony in Work. By S. Wyatt and J. A. Fraser. Report No. 56. Industrial Fatigue Research Board H.M. Stationery Office. 1929.

[6] The Mechanism of the Larynx. By V. E. Negus, M.S. Lond., F.R.C.S. Eng., Junior Surgeon for Diseases of the Throat and Nose, King's College Hospital, London. With an Introduction by Sir Arthur Keith, F.R.S. London: Wm. Heinemann, Ltd. 1929. Pp. 528. 45s.

[1] Privy Council: Medical Research Council, Special Report Series No. 134. Reports of the Committee on the Physiology of Vision. V. The Adaptation of the Eye: its Relation to the Critical Frequency of Flicker. By R. J. Lythgoe and K. Tansley.

frequency during dark adaptation rises. In the first case the cones are functioning, in the second case the rods. The brightness of the area surrounding the test patch is the most important factor in determining whether the critical frequency is of the rod or cone type. The outcome of investigations pursued by this method is to confirm what is already known in connexion with the phenomena of flicker. The "duplicity theory" of a double mechanism depending on the rods and cones respectively is assumed, and receives support from the results obtained. A novel suggestion based on the critical frequency of the retinal periphery in bright light is that the peripheral cones are functionally not identical with the foveal cones. If this is confirmed it will be in accordance with the known anatomical differences of the cones in the two regions.

AVERTIN FOR TETANUS.

The first instance, so far as we are aware, of the employment of avertin to control the spasms of tetanus, is related by Prof. Fritz Momburg and Dr. E. Rotthaus.[1] The drug appears to have been of the greatest possible service. The history of the case is briefly as follows: On July 21st, 1928, a girl of 7 fell down and got a small wound in the left patella. On July 28th, after an incubation period of only seven days, convulsions and stiffness of the limbs began. On the 29th severe trismus, opisthotonos, and rigidity of limbs supervened. Under avertin narcosis (0·17 g. per kilo) the wound was excised. Tetanus antitoxin was given intramuscularly, intravenously, and intrathecally to the extent of 20,000 units. During the next six days another 30,000 units were injected. During the 12 days following the operation the child was put under the influence of avertin 20 times. On two of the days she was made narcotic with avertin no less than three times. The dosage ranged between 0·1 g. and 0·18 g. per kilo of body-weight, and altogether she received 63·8 g. The worst days were the sixth to eighth, and the most distressing symptom was the terrible diaphragmatic cramp. For control of this, chloroform and oxygen were employed, and several times respiration ceased entirely. From the fourteenth day onward there were no convulsions, and the trismus diminished. On the forty-ninth day the child was discharged well. The authors are of opinion that the relief afforded by avertin during the acute stages of the illness was greater than any they had ever witnessed from other sedatives in similar conditions.

ANTENATAL CLINICS.

AN official memorandum[2] outlining the organisation of a modern antenatal clinic, and the minimum scope of its activities, is likely to be scrutinised with jealous care, for this welfare scheme has not been accepted so cordially by doctors, midwives or, indeed, by patients, as have the infant clinics. In fact, the exhaustive scheme accepted by the Representative Meeting of the British Medical Association last month mentioned the existence of antenatal centres only to express firmly the opinion that the usual routine work done there could be done quite as well at the consulting room of the doctor or at the home of the patient. Since, however, a national scheme which might render antenatal centres superfluous is as yet only in the stage of a resolution of the Representative Body, the views of the Ministry of Health on the organisation and duties of these centres are welcome.

No encroachment on professional interests is threatened by the memorandum; on the contrary, emphasis is laid on the advisory nature of the clinics, and on the desirability of restricting their work rigidly to the supervision of normal pregnancies. It is reasonable to demand that supervision must be adequate, since a false sense of security may do even more harm than neglect. A distinction made by the Ministry of Health between consulting clinics, staffed by expert obstetricians, for which no rules are laid down, and examination clinics, such as those subsidised by voluntary organisations or municipalities. The medical officer of one of these examination clinics, whether giving whole or part time service, should be trained and experienced both in obstetrics and antenatal work, and should have held a resident appointment in a maternity hospital or at least three months' post-graduate instruction at a recognised school. His first duty is to advise patients coming independently or sent by health visitors to book their confinements with doctor or midwife forthwith. When midwives send cases they are to be encouraged themselves to attend, and to make the necessary examinations under supervision, so as to avoid duplication, but every patient should be examined by a doctor at least twice during pregnancy. The suggestion is made that on booking a case the midwife should ascertain the name of the doctor the patient would wish to employ in case of need during labour, and should inform him of this possibility, and of the antenatal condition. Doctors may not altogether welcome a form of contingent booking which morally binds them to be available if difficulties occur, but on the other hand an unexpected summons to an unknown case may be even more unsatisfactory. Whatever the outcome of the labour, the midwife is to be asked to report to the clinic on its course, the local authority being advised to offer a small fee for a courtesy which is indispensable to the collection of reliable statistics. When a doctor has been booked for the confinement, and his patient attends the clinic, no examination should be made without his consent; he also is to be asked to report to the medical officer on the labour, no fee being mentioned in this connexion. Since, however, it is laid down that a doctor wishing to transfer the whole or part of the antenatal care of a patient to a clinic should be able to do so, he stands to gain so much from the facilities to be offered, which include reports on abnormal cases, that he is not likely to grudge information in return.

The reservation of beds in hospitals for abnormal maternity cases referred by clinics as well as by doctors is recommended in the memorandum; reciprocal advantage is an arrangement for patients living far from the hospitals where they intend to be confined to attend the nearest clinic during the whole or part of their pregnancy. One brief sentence implies the desirabliity of the extension of the maternity service throughout the country on lines already followed by the Hampstead local authority—the provision of obstetric consultants. The minimum number of routine examinations, according to the schedule, works out to nine or ten in normal cases, between the first examination at the sixteenth week and the confinement. This number may seem excessive, but most of the examinations need involve no more than measurement of uterine height and girth, auscultation of fœtal heart, tests of urine, and inquiries as to general health, and can be conducted by the midwife. At the thirty-second and thirty-sixth week the medical officer should endeavour to ascertain the presentation of the fœtus and the relation of head to pelvis.

The disadvantages of any system under which the doctor who examines a woman during pregnancy does not conduct her labour are obvious. But antenatal centres staffed by medical officers, to which practising midwives are welcomed with their patients, are a compromise which succeeds in providing for medical supervision in cases deemed to be normal, and for the diagnosis of abnormal ones, who are referred to the doctor concerned. In the present transitional stage of our maternity services it is not easy to suggest a

[1] Deutsch. Med. Woch., July 21st, 1929, p. 1164.

[2] Maternal Mortality in Childbirth. Antenatal Clinics: their Conduct and Scope. Mem. 145/M.C.W. 1929, H.M. Stationery Office.

better antenatal scheme than the one which would be available if all the welfare centres were raised to the standard indicated in this memorandum.

ANIMAL EXPERIMENTS.

BY a coincidence, the annual return[1] from the Home Office relating to experiments on living animals is issued this week, when the general arguments justifying vivisection are set out so eloquently in our columns by Prof. A. V. Hill. We need do no more than summarise the details of the return.

The names of 1310 persons who held licences for experiments on living animals during any part of the year 1928, and of the 256 registered places where such experiments can legally be performed, are set out. The number of experiments performed was 315,891, and these are classified according to their nature. Some 15,000 were performed under anæsthesia: this group includes all operations more severe than subcutaneous venesection. The rest, amounting to over 300,000, were mainly inoculations, but feeding experiments, the administration of substances by the mouth, by inhalation, or by external application, and the abstraction of blood by puncture or simple venesection, also come into this category.

It is often wrongly assumed that most of the operations are done in the hope of directly acquiring new knowledge; the truth is that the large majority are not experiments in this sense, but are biological tests necessary for the production or standardisation of drugs, serums or vaccines, or inoculations to confirm diagnosis. One licensee did over 69,000 experiments jointly with others, for the purpose of standardising drugs, and nearly all those who record large numbers of experiments performed under certificate A alone (that is, without anæsthetics, on animals other than dogs or cats, horses, asses or mules) were working for public health authorities, or in connexion with standardisation. The only reason for emphasising this distinction in purpose is to show how rigid is the supervision over even the most trivial routine animal inoculations, and how strict are the rules governing the issue of licenses. Registered places are constantly being visited by inspectors, mostly without previous notice, and the animals have been found suitably lodged and well cared for. The three irregularities reported during the year were obviously inadvertent and unimportant.

THE National Radium Trust have appointed Mr. P. Barter, of the Ministry of Health, Whitehall, to be Secretary of the Trust, and Mr. Niven F. McNicoll, of the Department of Health for Scotland, to be Assistant Secretary.

[1] H.M. Stationery Office, 1929, pp. 68, 1s. 3d.

PURE RIVERS SOCIETY.—At a recent meeting of this society, whose address is 1, Lincoln's Inn-fields, London, W.C.2, resolutions were forwarded to the heads of Government Departments concerned with rivers pollution. The Minister of Transport is urged to make it a condition of grants to local authorities for road-making that they shall not use on roads any poisonous substance which may affect rivers. The Minister of Agriculture and Fisheries is invited to arrange that subsidies to beet-sugar or other industries should only be granted on condition that adequate provision is made against pollution. The Minister of Health is asked to obtain power to set up River Boards on his own initiative without, as at present, having to wait for applications by the local authorities. It is also urged that a central authority on the lines of the Railway Commissioners should be set up to deal with river pollution, and a resolution asking for an amendment of the law relating to prosecutions for pollution has been sent to the Prime Minister.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles contributed by Invitation.

XXXIX.

THE DICK AND SCHULTZ-CHARLTON TESTS.

THE Dick test closely resembles the Schick[1] test. People who are susceptible to scarlet fever and have no scarlet fever antitoxin in the blood, show a red flush on the forearm when 0·2 c.cm. of an appropriate dilution (about 1 in 1000 to 2000) of scarlet fever toxin is injected intracutaneously. This toxin is the filtrate of a broth culture of the streptococcus associated with scarlet fever. By the injection of about 5 c.cm. of a good concentrated scarlet fever serum, immediate protection, lasting from two to three weeks, can be conferred on such people or they may be given prolonged immunity by active immunisation with three or four graded doses of the toxin. The same general conclusions apply, *mutatis mutandis*, as in the Schick test, though the concordance between a negative reaction and degree of immunity is less close. Thus, whereas practically all patients suffering from diphtheria are Schick-positive, from 5 per cent. to 20 per cent. of those with scarlet fever when first seen may be negative to the Dick test. It is possible that the average Dick-negative patient does not possess quite as high an immunity to scarlet fever as the Schick-negative reactor does to diphtheria.

Reading of Results.

The reading is usually made overnight, though a positive reaction in some patients may be easily read as early as four to eight hours after the injection. The red flush usually fades 48 to 72 hours later. When the control toxin has been sufficiently heated, "pseudo" reactions are so rare that "control" injections, after a little experience of their use in a given group of people, may often be dispensed with.

Treatment and the Test.

The Dick test may help in deciding on the treatment and disposal of a patient with a rash possibly due to scarlet fever. A positive Dick reaction will be consistent with the diagnosis of scarlet fever; unfortunately, a negative response will not exclude scarlet fever, for in a given series of patients with scarlet fever perhaps 1 in 10 might be Dick-negative. It is curious that the swab and direct smear from patients with rash is not more widely employed in diagnosis. The smear from the typical scarlet fever patient shows numerous diplococci or short chains of cocci. Swabs in almost every instance yield large numbers of colonies of hæmolytic streptococci on a blood plate after overnight growth in the incubator; the zone of hæmolysis is easily seen with the naked eye. From patients with rashes due to measles, rubella, drugs, or enemata, this blood plate with almost pure culture of hæmolytic streptococci is rarely obtained, though a close examination may yield a few colonies in perhaps 5 to 20 per cent. of the patients tested, as in any sample of the general population. The examination of swabs from convalescent patients has already been discussed in this series by Dr. J. G. MacCartney (THE LANCET, 1928, ii., 565). Several writers have recently brought forward some evidence suggesting that the convalescent whose swab still yielded hæmolytic streptococci on discharge was more apt to cause "return cases" of scarlet fever than the convalescent with a negative swab, and in Germany the necessity of a negative swab before discharge has been officially discussed. Since at present probably

[1] The Schick test was discussed in this series last week.

from one-third to one-half of the convalescents discharged after scarlet fever still have hæmolytic streptococci in throat or nose, a new addition to the perplexities of the medical officer of health appears to be threatened.

Contacts.

The tests aids us in dealing with those who have been or are exposed to the risk of infection. Though some authors have reported instances of scarlet fever in people who have given a negative Dick reaction, these are rare. Fifty patients under Dr. Sage Sutherland's care in Manchester became exposed to infection; of 37 negative reactors, none suffered from scarlet fever, while of 13 positive reactors, six became infected. Of 168 Dick-positive reactors under Dr. W. T. Benson's observation in Edinburgh, 36 contracted scarlet fever, while of 97 negative reactors none was atacked. Nursing staffs naturally Dick-negative, or made negative by immunisation, in Edinburgh, Birmingham, Aberdeen, Cardiff, and other large isolation hospitals, remain free from the disease. It is thus reasonable to act on the assumption that a contact who is negative to the test, either naturally, after active immunisation, or after receiving a prophylactic dose of antitoxin, will not develop the disease (though in the last instance the protection is but temporary). A dose of 5 c.cm. is successful when used as a routine in hospitals to control ward outbreaks; in this way the necessity for closure of wards is reduced or wholly avoided.

The Schultz-Charlton Test.

If the serum of a patient convalescent after scarlet fever (which contains the specific antitoxin), or the serum of an immunised horse, be injected intradermally into an area of skin showing an early scarlet fever rash, a blanching of the rash an inch or more wide will be found next day, perhaps persisting until the rash fades. This result is apparently completely specific; a rash which shows the blanching must be due to a scarlet fever streptococcus. Unfortunately, it is in testing characteristic vivid rashes (where no confirmatory test is called for) that the blanching is most definite, while in some atypical rashes in scarlet fever the blanching may not occur, nor does it appear if the scarlet fever rash be more than three days old.

Active Immunisation.

When active immunisation is contemplated the Dick test may be used to find those susceptible to scarlet fever, though children are to-day injected by some authorities without preliminary testing. There is no reason why the Schick and Dick test—and the later immunisation where needed—should not be done simultaneously; the Dick control injection may be omitted without much risk of error.

Reservations.

The test has been used on a large scale in clinical work and its utility clearly demonstrated, but there are a number of points and exceptions to the usual rules not at present understood. Thus, a few patients on admission with undoubted scarlet fever are negative to the ordinary Dick test; a number of patients on recovery, even though untreated with serum, remain positive to the test; the young baby, even though born of a Dick-positive mother, is often negative to the test and may be left to suckle from a mother suffering from scarlet fever without risk that it will develop the disease; adult rabbits will die from intravenous injection of scarlet fever culture or toxin while young rabbits may escape. These discrepancies are not met with in connexion with the Schick test. One suggested explanation, put forward mostly by American and German workers, is that the Dick-positive response represents an "allergy," a sensitiveness to the protein or other constituent of the scarlet fever streptococcus. For a full discussion of these conceptions (which at present concern the research worker more than the practising physician) the original papers must be consulted. It is possible that the truth lies halfway and that as in the tuberculin reaction, both a specific toxin and a specific sensitising body, protein or carbohydrate, play a part.

Summary.

The typical patient suffering from scarlet fever is positive to the Dick and Schultz-Charlton tests, and a blood-agar plate shows almost pure culture of hæmolytic streptococci. These three tests, used with a recognition of their limitations, are of aid in the diagnosis and prevention of scarlet fever.

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Special Articles.

THE CHROMOSOME IMBALANCE THEORY OF CARCINOGENESIS.

BY J. A. MURRAY, M.D., B.Sc. EDIN., F.R.S.,
DIRECTOR OF THE IMPERIAL CANCER RESEARCH FUND.

Boveri's essay, "Zur Frage der Entstehung maligner Tumoren," was published in 1914. The stern preoccupation of the war and Boveri's death prevented any widespread discussion of his views. Recently both in Germany and in America renewed interest has been evinced in the theory he propounded and an admirable and faithful translation into English has been made by Mrs. Boveri.[1] Prof. M. N. Metcalf, who provides a sympathetic introduction to the translation, has, in another place, deplored that as the only pupil of Boveri engaged in cancer research, I have not explored the possibilities opened up by Boveri's theory. This fact, and the intrinsic interest of the theory, lead me to take this opportunity to give a summary of it and the reasons for my own attitude.

The Theory Summarised.

The theory may be summarised as follows. The cancer problem is a cell problem. The cancer cell is essentially a defective cell, and the defect is in the nature of an inherent permanent change imposed on it and all its progeny, at the time it arises from a previously non-cancerous ordinary cell of the body. One of the most clearly demonstrated ways in which a permanent transmissible defect can be produced in a cell is by the elimination of a chromosome or chromosomes from the nucleus, as occurs in multipolar mitotic division. As chromosomes each divide into two in mitosis, it is clear that the presence of more than two centrosomes in the mitotic figure must lead to an unequal distribution of the daughter chromosomes to the resulting daughter cells. Boveri's analysis of the consequences of a primary multipolar division of the disperm fertilised sea-urchin egg showed that the larvæ which develop are pathological when all the chromosomes take part in a single distorted equatorial plate surrounded by four attraction systems (tetraster). The four quadrants of the resulting blastula are pathological to different degrees and in different ways. Two of these pathological pictures are extraordinarily suggestive and impressive. In one, the cells leave the blastula wall and migrate into the blastula cavity, forming an irregular heap of rounded or polygonal cells. In the other the cells separate from each other and from the remainder of the blastula, and float away as free elements in the surrounding sea water. One seems to have in diagrammatic simplified form loss of differentiation, the breaking up of physiological union, and metastasis formation. This observation undoubtedly was the germ of the theory in Boveri's

[1] The Origin of Malignant Tumours. By Theodor Boveri. Translated by Marcella Boveri. London: Baillière, Tindall and Cox. 1929. Pp. 119. 11s. 6d.

mind. In the first instance, and in its simplest form, the cancer cell arises singly as one of the products of multipolar mitosis, in which the fortuitous distribution of the half-chromosomes has resulted in a nucleus, capable of continued existence, but defective in chromosome-individuals necessary for the ordered growth and metabolism of the normal cells.

Certain Objections.

When Boveri came to write up this idea in the form of a connected theory many further observations and analogies were drawn upon, and the discussion of objections, to which a separate chapter is devoted, is a fascinating example of subtlety, erudition, and scientific humility. He at once realised that the uniformity of the tumours which arise when the stroma of a transplantable mouse carcinoma undergoes sarcomatous transformation and, still more, the uniformity of the filterable tumours of the fowl, were fatal to the hypothesis which, in its original simple form, depended on the fortuitous result of multipolar mitosis. To meet this difficulty it was assumed that cell-poisons acting specifically on single chromosomes, inhibiting or enhancing their action, might intervene in the process. The analogy of certain hybridisation experiments with sea-urchin eggs was cited in support of this assumption. Baltzer, in fact, had shown that in some crosses only a few of the male chromosomes entered the fertilisation spindle and took part in the formation of the embryonic nuclei. The others remained inert and were handed on passively to one or other daughter cell till they degenerated. The theory of chromosome imbalance thus acquired a considerable increase of strength having, like the incalculable Kai Lung, a tale to fit any possible concatenation of circumstances.

Conclusion.

It is idle to speculate how the intensely practical experimental mind of Boveri would have reacted to the great acquisition of knowledge of carcinogenesis in the last ten or twelve years. A theory or hypothesis which could not lead to the planning of decisive experiments had little permanent appeal for him, and he candidly reports the complete unsuccess of the large number of experiments he himself carried out to test his views. On sending me a copy of the original paper in 1914 he wrote: "I expect you will smile at it, but one must do what one can." In spite of the most serious consideration of the theory, and an affectionate admiration for the author, I have never been able to acquiesce in the fundamental conceptions of cancer which underlie it. Loss of differentiation, loss of physiological control, are the negative side of the cancer cell. Its independence and greater adaptability to external conditions seem to me rather to indicate an acquisition of new properties, not defects. The recent attempt of Bauer still further to fortify the hypothesis by substituting destruction or inhibition (or conversely over-activation) of single genes only has the effect of withdrawing still further the theory from experimental proof or disproof and thereby lessening its utility. It is now many years since I relinquished the attempt, after laborious trials, to find constant significant alterations in chromosome numbers, nuclear size, or nucleus-protoplasm ratio in cancer cells. The facts, so far as they went, did not harmonise with Boveri's theory. The subsequent modifications, while they may diminish the weight of this negative evidence, do not furnish compensating advantages in devising more conclusive tests of its validity.

A REDCAR HOSPITAL.—The Yorkshire borough of Redcar, which has a population estimated at 22,000, and receives many thousands of visitors every year, has hitherto been without a hospital. The need has now been supplied by the presentation to the town by Mr. Arnold Stead of his residence, Everdon, as a memorial to his father. The building, which has been adapted to hospital purposes, contains seven beds, and has been fitted with apparatus for sunlight treatment, was last week opened by the Dowager Marchioness of Zetland.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Edinburgh University: Address to Graduates in Medicine.

THE Professor of Bacteriology, Dr. T. J. Mackie, was charged with the duty of addressing new graduates in medicine of Edinburgh University last month. He reviewed the present system of medical education, which needed drastic revision. The outstanding faults of the educational system now in force were the products of its growth and evolution. Medicine was once entirely art; it was now mainly science, and was one of the great divisions of biology. The medical worker might well be the supreme biologist, and it was all-important that at the very threshold of university study there should be a rational introduction to general biology—not botany, zoology, or anatomy as such, but the science of life in its broadest aspects—leading up to the more specialised study of the biology of the human species, with whose vital problems the doctor had to grapple throughout his career. The physical sciences lay at the very foundation of biology and medicine. Some medical schools had attempted to relieve the pressure of their curricula by separating off such basic studies in the first of a six years' course, leaving five years for purely medical subjects. The addition of a year to the curriculum seemed at first sight the obvious solution of a difficult educational problem, but it might still be possible to maintain the original quinquennium by a closer coördination of these preliminary studies, one with another, and with that of anatomy and physiology during the first and second years. The latter subjects constituted an integral part of the fundamental biological training and with biology, physics, and chemistry, made up the complete basic structure of their educational edifice. From the study of normal biological phenomena, the student turned to the abnormalities, accidents, and infirmities from which humanity sought protection and relief. From biology as a pure science he passed to the applied biology of practical medicine. The question arose whether the existing system of examinations in subjects might be replaced by yearly examinations, corresponding to annual units of instruction. As to the clinical part of the curriculum, it was sometimes claimed that the scientific attitude was incompatible with practical work as a doctor, and that the so-called medical art should be inculcated by bedside training according to thoroughly practical tenets, leaving scientific medicine as a thing apart in the research laboratories. If medical training were stripped of its scientific instruction, however, it would hardly justify a University degree, and would be degraded back to a mere apprenticeship. The practice of medicine was becoming more and more of an applied science, and necessitated a training in fundamental principles. The practitioner was constantly confronted with problems that were only to be elucidated by scientific method. It must also be remembered that scientific applications and laboratory methods had in modern times proved their value in medicine to such an extent that the hospital ward was no longer the centre of gravity of medical enterprise. The laboratories were serving humanity in the cure and especially in the prevention of physical suffering, as much as were the clinics. Lastly, a medical education would serve our civilisation poorly if it did not kindle fires of research among those pupils of originality and initiative who were responsive to the inspiration of scientific teaching. Our present system of training did not provide sufficient opportunities for those who might wish a more complete science training. On the analogy of the honours degrees in other faculties there might be instituted an Honours Degree in Medicine, connoting special and advanced study of one or more branches of medical science in addition to the general curriculum.

Bi-Centenary of the Edinburgh Royal Infirmary.

Arrangements for the celebration of the bi-centenary of Edinburgh Royal Infirmary have now provisionally taken shape. The anniversary of the opening of the institution fell on August 6th, and as that is the time of the year when holidays take a great many away from the city, it has been decided to defer the public part of the celebration till early in October. August 6th, however, did not go unmarked; on that day, an illustrated commemorative card was distributed to every patient and every member of the staff in the infirmary. The proposal for October is that the bi-centenary should be the subject of a thanksgiving service in St. Giles Cathedral, and, later in the same day, of a public meeting, when an appeal will be launched for the extension scheme on the site of George Watson's College. The intention is to provide a maternity and gynæcological hospital for the accommodation of 240 patients at a cost of £300,000; certain notable donations have been already made to this end.

The late Mr. A. G. Miller.

The death occurred in Edinburgh on Monday, July 29th, of Mr. Alexander Gordon Miller, consulting surgeon to the Royal Infirmary, Edinburgh, in the eighty-seventh year of his age.

Mr. A. G. Miller was the son of Prof. James Miller, formerly professor of surgery in the University of Edinburgh, and was educated at Edinburgh Academy and the University, graduating in medicine in 1864. He held house appointments in the Infirmary, took the Fellowship of the Edinburgh College of Surgeons, and in 1877 became assistant surgeon to the institution. Five years later he was appointed full surgeon in the new Royal Infirmary which had just been built. It will be seen by the dates that when he received his staff appointment the question of antiseptic surgery and the value of the Listerian system was still acute, when he, with most of his younger contemporaries, recognised the value of the new work, while the seniors on the staff were unable to reconcile themselves to the revolutionary theories. But it must be remembered that many of those seniors were not, strictly speaking, consulting surgeons, but rather could be described as successful general practitioners, who carried on surgical work if and when required. Miller displayed in his surgical work considerable originality, being the deviser of a method for excising the knee, a method for reducing dislocation of the shoulder, and a new technique for disarticulation at the knee-joint. The general level of his teaching in the wards secured his appointment as lecturer on surgery and as an examiner in that subject at the University, and also at the Scottish Royal Colleges. Although he had outlived most of his colleagues, there are still students who remember the interest which he took in their careers, his enthusiasm as a volunteer, and his strong advocacy of the temperance cause. He was, and for good cause, very highly respected.

Dr. Thomas W. M. Cameron, M.R.C.V.S., of the London School of Hygiene and Tropical Medicine, has been appointed lecturer in Helminthology in the Department of Zoology of the University of Edinburgh, and the Royal (Dick) Veterinary College.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

Rural Medical Service.

THE results of a study of 860 replies to a questionaire on the availability, quality, and cost of medical service in rural districts throughout the United States is published in a recent issue of *The Farmer's Wife*. It is found that the average distance of the farmer from the nearest doctor is just over seven miles; the average time required for the doctor to reach the patient is, in summer, half an hour, and in winter, 56 minutes. Nearly one half of the farmers, however, are not satisfied to patronise the nearest doctor for all troubles, though nearly 90 per cent. will do so for minor ills. Where the choice of medical attendant is exercised, the average distance travelled by the doctor leaps from 7 miles to 19. Specialists are even more remote; 15 per cent. of the farms, for example, have no nose and throat specialist within a radius of 50 miles. The average distance to hospital is 18 miles, and the time needed to reach it 49 minutes in summer and 97 minutes in winter. There is some evidence that the modern public health campaign has penetrated even to remote districts. Two-thirds of the school-children have health inspection at least once a year, though only in about half of these inspections does a physician take any part. A nurse is usually present and active. In the event of sickness in the home, according to over 80 per cent. of the replies, a nurse is available within 12 hours. During the year the "average" farmer spends 105 dollars (about £21) on expense due to sickness. Of this, rather less than half goes in doctor's bills. The average fee charged for a home call was $7.63, for an "office" visit $1.59. It is interesting to learn that 95 per cent. of the homes had summoned a doctor for the birth of the last baby. The average fee for a confinement case is $28.33.

The Prevalence of Undulant Fever.

At a recent meeting of the Georgia State Medical Association Dr. E. A. Banker, jun., drew attention to the increasing importance of undulant fever in this country, and recommended that it should be made a reportable disease in all States. From the State of New York is reported the ironic fate of a health officer who declined to use pasteurised milk, favouring instead a small and well-supervised dairy, which gave milk unusually rich in cream. He fell victim to a continuous fever, and the State department, aiding in the diagnosis, was able to isolate *B. abortus* both from the patient's blood and from the blood and milk of one of the cows. At the same meeting Dr. T. E. Oertel, of Augusta, pointed out that serpents are still plentiful in the South-Eastern States, but that very few of them are poisonous. The great majority are not only highly ornamental but are useful to the farmer by feeding on vermin, and should be protected. The water snakes, however, should be destroyed for the protection of fish. By far the most important of the venomous snakes is the rattle-snake, which is easily recognised. There are also two species of coral snakes in the United States, only one of which is found in the East. During the year 1928 31 cases of snake-bites from poisonous serpents were reported in Georgia.

Possible Danger of Artificial Refrigerators.

The rapidly increasing use, partly no doubt the result of concentrated advertising, of artificial refrigerators in place of the once universal ice-box, lends a special interest to a coroner's inquest held at the beginning of this month in Chicago. The coroner's jury was composed of a group of distinguished scientists, including Prof. Hayhurst, of Ohio State University, and three professors from the University of Chicago. The coroner's chemist gave evidence that death was due to methyl chloride poisoning, and that guinea-pigs placed in the deceased's flat had also died from the same cause. A definite leak had been found in the refrigerator, and the air of the flat was found to be heavily contaminated with methyl chloride gas. The jury found that the cause of death was inhalation of this gas, and recommended that steps be taken to prevent further sickness and death from such causes. The city health officer and other physicians believe that there have been other cases of sickness and death from this cause in recent months.

Public Health Services.

PORT OF LIVERPOOL.

IN his report for 1928 to the Liverpool Port Sanitary Authority Dr. A. A. Mussen mentions 5110 visits of inspection paid to ships, of which 933 (948 last year) had nuisances on board; there were 3131 (3297) dirty forecastles, and 363 (409) foul w.c.'s. He explains that it is when men are leaving ships they permit their forecastles to become nuisances. Complaints are rare when crews are still attached to the ships, and this may be why dirty forecastles are less often noted on foreign ships, for only British ships discharge their crews at Liverpool.

Of 39 cases of enteric fever mentioned as occurring during voyages that brought ships to Liverpool, 23 were among the crews; the same was true of 28 of the 52 varicella cases. Sixty cases of tubercle were landed, their origin being unstated. No cases of cholera, plague, or yellow fever were brought ashore, but 12 rats were found to be infected with plague, none of which, however, was caught ashore. In 1928 plague was prevalent in Aden, Lagos, Rangoon, and Bombay: cholera in Calcutta and Shanghai; and yellow fever in South America and West Africa. Of anthrax, 8 cases appeared in or near Liverpool and one died.

On ships 29,189 (31,357) rats were found, and in the port 2250 (2382)—a decrease in spite of increased activity in the search. The city yielded 16,664 (17,671). This is the third year in which the total found in Liverpool has decreased, the figures being 55,012 in 1926, 51,410 in 1927, and 48,103 in 1928. Rats are decreasing on Liverpool ships, probably because the ships are being better rat-proofed. On 45 "rat-proofed" ships fumigation killed 3·1 rats per ship; on 68 ships, not rat-proofed, fumigation killed 25·5 per ship. On 16 ships of two unnamed companies which rat-proof their ships and keenly trap rats, no rats were found at all; 31 ships of other companies averaged 14 rats per ship. Rats are to be reduced, Dr. Mussen thinks, by careful supervision when loading abroad, by rat-proofing to prevent them from straying round the ship in search of water or nesting places, by trapping, and by periodic fumigation. Cats on board ship are too well fed to be any safeguard. Since October all foreign-going ships of the world have been examined for rats; if found free they get a deratisation exemption certificate, valid for six months; if rats are found fumigation is done and a deratisation certificate, also valid for six months, is issued under the sanction of the International Sanitary Convention. This Convention, signed at Paris in 1926, is set out at length in the valuable Appendix to the report.

The Seamen's Dispensary dealt with 2043 (1843) cases of venereal disease. In every 100 cases there were 33·5 of syphilis (a quarter of them not yet Wassermann-positive), 4·5 of soft chancre, and 62 of gonorrhœa. These are cases, not first infections. Of 101,725 male attendances in all the Liverpool treatment centres, 1579 were for soft chancre; but of 15,265 female attendances, only 4. Of 20,688 aliens who arrived at the port 9 were certified—5 for mental deficiency, 2 for venereal disease, 1 for hyperthyroidism, and 1 for epilepsy. Of 116,083 emigrants, 16 were rejected for infectious diseases. The arrangements for food inspection are given in detail; the amount condemned and supervised was 1967 (2621) tons; in this section of the report is an interesting discussion of the methods of preparation of currants in Greece. The Port Sanitary Authority gives certificates of disinfection before the export of rags, &c., and of the wholesomeness and cleanliness of preparation of exported foods.

This year's report contains much useful information, and the general provisions of the International Convention set out in the Appendix make it clear how greatly the confidence of the world in the work of the Port Sanitary Authorities of the other nations—formerly discussed with so much suspicion—has increased in the last 30 years.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are some 1928 statistics of two large east coast seaport cities:—

Name of city and estimated (R.-G.) population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Young child (1–5 yr. mortality.	Maternal mortality from childbirth.
Edinburgh .. (428,454)	17·3	13·7	1·05	1·60	2·2	2·1	75	30	39	7·8*
Hull .. .. (297,600)	20·5	12·8	1·21	1·44	2·2	2·3	79	30	30	4·1*

* These figures are not strictly comparable owing to the different methods of classification adopted by the English and Scottish Registrars-General. The figures for puerperal sepsis alone are Edinburgh 2·7, Hull 2·1; and the Hull figure for childbirth becomes 4·6 if three deaths associated with pregnancy and child-bearing be included.

Edinburgh.

Dr. W. Robertson describes a death-rate of 13·7 as a satisfactory figure, but points out that the congested areas sully the vital statistics. Thus the death-rates for St. Giles, St. Leonards, St. Andrews and North Leith wards were 18·5, 16·2, 15·7 and 17·2 respectively. The infant mortality-rate is the lowest ever recorded for the city. The scheme for providing cookery lessons for the mothers, with elementary appliances, such as are available in the poorest homes, has proved a great success. Illustrations are given of the lessons in progress, and of safe playgrounds for the children while the mothers are so engaged. A great point is made of using simple and often neglected valuable foods. One aim of the cookery lessons is to stimulate the housewives to desire a house in which the meals can be prepared with far greater ease. The various housing schemes have already demonstrated their value in the improved health of the children, and it is further hoped that the almost magical effect of a sojourn in a convalescent or holiday home on slum children should result in much more accommodation of this kind being provided. Recently four improvement schemes have been initiated involving nearly 2000 houses. Further progress depends upon the rate of building. Reconditioning is not likely to be of much service in the congested areas of large Scottish towns, in which the old-type of tenement with its long dark passages, gloomy ill-ventilated lobbies and centrally placed stairways prevails. The architect finds that it is cheaper to build new houses than to gut and recondition such old properties. Reconditioning, if it can be done cheaply, may occasionally be of some service for old couples, single persons and childless folk. For growing children the out-lying areas are the places for housing schemes. The worst statistics are recorded in those wards where one and two-roomed houses are most numerous. Thus St. Giles has 1142 single-roomed dwellings and 694 of two rooms, whilst St. Leonards ward has 1206 single-roomed and 2484 two-roomed houses. Many citizens have gladly seized the chance to change over into well-equipped municipal houses. The slum-dweller must now have his turn, says Dr. Robertson, and those who can afford to pay economic rents should not look to corporations to provide houses for them, but get into touch with building societies, &c. Schemes for providing well-

conducted hostels for men and women are taking definite shape.

Turning to infectious diseases, Dr. Robertson points out that ecomomies have been effected by treating more of the scarlet fever cases in their homes. Immunisation against diphtheria among school children can only proceed slowly with the present staff. The hospital experience during the year showed that immunisation by toxoid-antitoxin injections did not ensure absolute protection among the nurses. There were two cases of diphtheria in nurses, who had apparently been successfully immunised, but in each case the attack was mild and recovery rapid. On the other hand, there were no cases of scarlet fever among the immunised nursing staff. Dr. David Lees, the V.D. medical officer, brings out several interesting points. A much larger number of patients now come to the clinics to have their condition investigated, who, after searching tests, show no evidence of venereal infection. Thus the non-venereal cases attending the clinic have increased year by year from 727 in 1924 to 2362 in 1928. Repeated examinations are necessary to discover evidence of the gonococcal infection in ophthalmia cases, if a silver preparation has been used before attendance at the clinic. Vulvo-vaginitis in children, usually the result of sleeping with infected parents, requires long periods of hospitalisation for its cure. In-patient treatment is much more valuable in female infections and increased bed accommodation, especially for married women, is an urgent necessity. Intensive in-patient treatment for a few weeks often saves much time and suffering. The number of defaulters, who discontinued treatment before being cured was 863 and the report of the nurses, who follow up these defaulters and endeavour to get them to resume attendance, shows how hopeless this work frequently is, and justifies the proposals for some form of compulsion.

The death-rate from pulmonary tuberculosis was the lowest ever recorded and there is a satisfactory decline in non-pulmonary tuberculosis. During the year 16 patients were admitted to the Polton Farm Colony and 11 discharged. The expenses for the upkeep of the colony amounted to £3097, and the receipts from the sale of pigs, poultry, eggs and other produce were £1557—a net expenditure of £1540.

The testing of the Victoria Hospital tubercle-free herd revealed only one reactor, which had a small lesion in the mediastinal glands. The municipal farm has been reconditioned and during the spring and summer a herd of about 80 tubercle-free cattle was purchased, amongst which at the November retesting these was one doubtful reactor. All the municipal hospitals are now supplied with milk from this farm. The city cow population is 3421, and amongst these 43 tuberculous cows were found during the year and eliminated from the herds. The incidence of tuberculosis in the city and district as revealed by post-mortem statistics at the abattoirs, says Mr. A. Gofton, the chief veterinary inspector, shows no material change as compared with former years. Of 119 bulk samples of country milk 6 or 5 per cent. were found to be tuberculous—a smaller percentage than the average of recent years. Of the 187 samples of milk taken under the Sale and Food and Drugs Acts the city analyst reported 42 as adulterated. The average milk fat of all these statutory samples was only 3·48 per cent., which may be compared with the average composition of similar statutory samples, also including the adulterated samples, in the report of the Lancashire public analyst for 1927. It is there shown (p. 7) that the aggregate samples, numbering 87,981, taken in eight districts in the North of England over a period of years the average fat was 3·64 per cent., whilst the lowest average among the eight districts (Liverpool) gave an average of 3·60 per cent. One dealer in Edinburgh with two previous convictions against him was fined £35 for selling milk 36 per cent. deficient in fat and containing 38 per cent. of added water. There is said to be room for more antenatal work in Edinburgh, especially in the outlying parts of the city. Dr. T. Y. Finlay (M. & C.W.M.O.) points out that this work should be in close association with a maternity hospital and that, to be really effective, it should be in the charge of obstetric specialists, or expert doctors, who are in daily contact with midwifery practice. The fact that the health visitor is seldom in direct touch with the antenatal clinic also detracts greatly from the real usefulness of her visit.

The chief sanitary inspector, Mr. A. W. Ritchie, draws attention to the failure of householders to see that their water cisterns are cleaned every six months. This raises the point that no householder ought to use Edinburgh's excellent water for drinking purposes after it has passed through a cistern, even if it is cleaned out every day and that each house should be supplied with at least one tap direct from the main for drinking and culinary purposes. Liverpool have special powers to enforce this.

Hull.

Dr. W. Allen Daley (whose appointment as divisional medical officer to the London County Council has recently been announced) reports that the year has been a busy one, in planning for the unification of the medical services of Kingston-upon-Hull, and preparing for important developments with respect to the establishment of the new isolation hospital, the extension of the city's boundaries, and the taking over of the medical work now done by the Guardians. The interavailability of the clinics has worked successfully. Thus there were 11,315 attendances of pre-school children and expectant and nursing mothers at the Education Committee's clinics, and 733 of school children, and 1096 of tuberculosis cases at the M. & C.W. light clinic. The East Hull clinic is to be erected on the site adjoining the East Tuberculosis Dispensary and will provide for East Hull all clinics and treatment supplied by the M. & C.W. and school medical departments. The various authorities have also adopted a scheme for the inter-change of their medical staff. Thus medical officers can be taken from routine work and turned on to emergency work. Again, during holidays, school medical officers can be given work in other departments. Assistance when needed will be furnished to the port medical officer, who on his side, will take part in administrative work. The new scheme, in fact, provides for the same doctors to work in the M. & C.W., school medical, tuberculosis, and other departments, and this will not only be good for the patients, but will save the officers from getting into watertight compartments and from having a limited outlook. Four of the senior staff will be primarily each in change of a department, while available for work in other departments These four seniors meet the medical officer of health once a month to discuss administrative matters, whilst evening meetings are held from time to time of the whole of the medical staff, numbering 25, for the reading of papers, discussions, &c. The new isolation hospital has made progress. The first four pavilions are completed and it will probably be opened about August, 1929, after which the existing hospital will be adapted for use as a maternity home and infants' hospital to accommodate 81 patients It is intended to make this new maternity home a model of efficiency. At the end of the year the privy conversion scheme was nearly completed, 38,650 out of 40,650 conversions having been completed and 614 unnecessary privies and pail-closets removed. The 1380 remaining privies and pail-closets are mostly in property which has to be demolished or in unsewered areas.

The municipal houses erected numbered 1008 in the suburbs and 12 tenements in the New George-street area, where further demolitions have been effected and another block of eight tenements and four lock-up shops is being erected. Two further improvement schemes will shortly be undertaken. Central heating on the Cookanheat system has been

installed in 2650 municipal houses. There is considerable prejudice against central heating among those, who are accustomed to coal fires. Complaints have been received that when sufficient heat is raised to warm the bedrooms, the living rooms become unbearably stuffy. A plebiscite among the tenants showed 30 per cent. for and 70 per cent. against central heating, but some of them have changed their minds as the result of six months' trial of the installation. The corporation now contemplate building houses with sash windows, instead of casement, as being more easily openable in bad weather, and they are also constructing open fire-places with the fire in one room and the oven in another. In order to remove grounds for complaint in the centrally heated houses, ventilators are to be fitted in the living rooms. In some cases the tenants have neutralised one of the advantages of the Cookanheat system by using coal instead of a smokeless fuel The municipal building programme is being extended and probably 1500 houses and flats will be erected in 1929. In all present or future schemes bricks are being used in preference to concrete or other patent forms of construction. On the East Hull estate there were 40 parlour houses to let at the end of the year, but there is still a demand for parlour houses in North and West Hull and a vigorous demand for the smaller type of corporation house at all-in weekly rentals of 12*s.* 2*d.* and 13*s.* 6*d.* for two and three-bedroomed houses respectively. Dr. Daley points out, however, that the housing problem is not solved until houses have been erected at rentals which can be paid by families of five or six with incomes from £2 to £3 per week.

The Hull medical committee on cancer, at the suggestion of the Ministry of Health, is to investigate cancer of the breast, uterus and rectum. Lectures on the early diagnosis and treatment of cancer are given to medical men and women, and the committee are taking steps to secure an increased amount of radium for the treatment of cancer in the city. Hull like Edinburgh, recorded its lowest infantile mortality figure in 1928, and this in spite of a hot summer and an increase in the diarrhœa deaths. The hours of bright sunshine were 1339 in 1928, 1118 in 1927 and 1299 in 1926. Dr. Daley compares the diarrhœa deaths in 1928 with the hot summer of 1911, when infant welfare work was in an undeveloped condition. In 1928 there were 64 diarrhœa deaths under 1 year, 8 between 1 and 2 years, 2 between 2 and 5 years and 8 over 5, whereas in 1911 there were 423 under 1 year, 105 between 1 and 2, 26 between 2 and 5 and 54 at ages over 5. There was an outbreak of small-pox during the summer, which lasted until November and gave rise to 65 known cases. The outbreak began with a family which contracted the infection in a town in the West Riding. They had stayed during Whitsuntide in a house where there was supposed to be chicken-pox. The disease was very mild in character and there were no deaths. In most of the cases the onset was characterised by headache, dizziness and a feeling of "swimminess," associated with vomiting; backache was not a common feature, and in only four cases was sore-throat complained of. Dr. Daley gives full details and shows how the spread of infection was apparently helped by continuous desks in the schools. The infectivity of the disease was not nearly so great as that of small-pox of a generation ago. As the first cases had about four weeks' start of the intelligence department, the task of searching out new cases in order to restrict the outbreak was one of great magnitude. It is hoped to develop an anti-rheumatic centre in connexion with the medicinal baths. Dr. Daley points out that insured persons in Hull consumed 22 per cent. more medicine than the average for the area.

The reductase test has proved satisfactory as a preliminary bacteriological test for milk. Of 82 samples of "outside" milk examined for tubercle, eight or ten per cent. gave a positive result. In following up the eight positive cases, tuberculous cows were only discovered on three occasions. In the remainder the offending cows had probably been sold. An East Riding cow-keeper, who sent two tuberculous cows to a Hull slaughter-house, was fined £25 for failure to notify. A "urinary" enteric carrier, who was under observation in 1927, was to be considered free from infection if four consecutive negative tests were obtained; after three negative tests in August and September, the October sample proved positive and he is still under observation. It has been decided to erect an orthopædic hospital of 100 beds adjoining the sanatorium and isolation hospital at Cottingham. There is a striking reduction in the notifications of ophthalmia neonatorum during the last two years. During 1928 651 cases were admitted to the maternity home for confinement and there were no maternal deaths. Early induction of labour was needed for 37 of the cases, and 32 of the babies were discharged alive. Of the five infants who were lost, one was the baby of an epileptic, one of a patient suffering from severe albuminuria, one was macerated and two died of pemphigus neonatorum. About 25 per cent. of the expectant mothers attended a municipal antenatal clinic. Among the 1561 women who so attended, there were only two maternal deaths—i.e., one death for 780 confinements—whilst among those who did not attend a clinic, there was approximately one death for 197 confinements.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED JULY 27TH, 1929.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 129 (last week, 144); scarlet fever, 1764; diphtheria, 933; enteric fever, 58; pneumonia, 852; puerperal fever, 35; puerperal pyrexia, 97; cerebro-spinal fever, 12; acute poliomyelitis, 12; acute polio-encephalitis, 1; encephalitis lethargica, 20; dysentery, 4; and ophthalmia neonatorum, 120. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the Metropolitan Asylums Board on July 30th–31st was as follows:—Small-pox, 161 under treatment, 9 under observation (last week 173 and 3 respectively); scarlet fever, 1428; diphtheria, 1626; enteric fever, 12; measles, 317; whooping-cough, 330; puerperal fever, 25 (plus 12 babies); encephalitis lethargica, 123; "other diseases" 24. At St. Margaret's Hospital there were 15 babies (plus 9 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was 1 (1) death from small-pox, 3 (0) from enteric fever, 33 (5) from measles, 7 (3) from scarlet fever, 24 (5) from whooping-cough, 13 (2) from diphtheria, 44 (10) from diarrhœa and enteritis under two years, and 20 (3) from influenza. The figures in parentheses are those for London itself.

Liverpool reported 7 deaths from measles, and Manchester and Bradford 3 each. Liverpool also reported 5 deaths from diarrhœa and enteritis, and Manchester and Salford 3 each.

The number of stillbirths reported during the week was 244 (corresponding to a rate of 35 per 1000 births), including 34 in London.

BRITISH DENTAL HOSPITAL.—The annual report of this institution, the primary object of which is the establishment of centres at which dental treatment is available for persons unable to pay for private treatment, shows that last year the number of patients' attendances was 19,426. There are nearly a score of treatment centres and clinics in various parts of London, some of them with maternity, tuberculosis, and children's departments; at the Lewisham L.C.C. school dental, minor ailments, and aural central clinic there were 4815 attendances. Arrangements are being made for the establishment of additional clinics, and for the treatment at reduced fees of adolescents between the ages of 16 and 21, who are ineligible for dental benefit. Adolescents between the ages of 14 and 16, who are not insured persons, are already provided for by the hospital.

EXHIBITION
OF
DRUGS, SURGICAL INSTRUMENTS, FOODS, AND APPLIANCES AT THE BRITISH MEDICAL ASSOCIATION MEETING.

THE exhibition in the City Exhibition Hall, Manchester, which was open from July 22nd to 26th, was unusually complete and well arranged and gave practitioners attending the annual meeting of the B.M.A. an opportunity of refreshing their memory of products and appliances new and old. Ample space was provided for the exhibits and in every case the attendants were ready with expert advice. It is impossible to do more than indicate some of the products which attracted attention.

DRUGS AND PHARMACEUTICAL PREPARATIONS.

1. *General Drug Exhibits.*

[12] and [35] Oppenheimer, Son and Co., Ltd. (179, Queen Victoria-street, E.C. 4), showed a series of preparations with the hall-mark "O.S. & Co.," including Roboleine and Vitad, the latter being the unsaponifiable fraction of cod-liver oil containing a high concentration of vitamins A and D, a palatinoid being equivalent to one-half or a whole teaspoonful of cod-liver oil.—[23] Bayer Products, Ltd. (19, St. Dunstan's-hill, E.C. 3), drew attention to a range of well-tested synthetic remedies including Adalin, Helmitol, Luminal, Phanodorm, and especially Avertin, a basal anæsthetic administered per rectum with advantages alike for surgeon, patient, and anæsthetist; also the Iso-double ampoule of Neosalvarsan.—[33] The Saccharin Corporation, Ltd. (72, Oxford-street, W. 1), showed among their specialties Novocain, Glaucosan, Trivalin, and Causticin.—[36] Boots Pure Drug Co., Ltd. (Nottingham), had a large exhibit of fine chemicals and packed specialties including Sulphostab and Stabilarsan, an improved "914" for intramuscular injection, approved by the Ministry of Health. Bismostab contains a high concentration of metallic bismuth in isotonic glucose. Among other preparations Hexylresorcinol and Acriflavine were shown as well as Ephedrine and Insulin, at a present price to the patient of 1*s.* 8*d.* per 5 c.cm. ampoule of 100 units.—[48] Burroughs Wellcome and Co. (Snow Hill Buildings, E.C. 1) exhibited products resulting from recent scientific research and other preparations of outstanding importance in various branches of medicine, including micro-organism displays of scarlet fever, diphtheria, syphilis, influenza, pneumonia, leprosy, tuberculosis, and malaria. A number of plants selected from their Dartford farm reminded visitors that certain alkaloid-yielding plants can be cultivated to perfection in England.—[49] Sandoz Chemical Works (5, Wigmore-street, W. 1) had on view a new method of administering allium sativum and examples of Calcium-Sandoz, Sandoptal, Felamine, Femergin, Lobeline, and Scillaren.—[50] Schering, Ltd. (3, Lloyd's-avenue, E.C.3), called attention to Veramon as a safe and successful analgesic, Atophan, a popular uric acid eliminant, and Solganal, a new gold product of low toxicity for intravenous injection in tuberculosis and leprosy.—[61] and [62] Crookes Collosols (22, Chenies-street, W.C. 1) were showing original colloidal preparations for medicinal use with especial emphasis on Collosol Calcium, as employed in osteomalacia, tuberculosis, urticaria, and menorrhagia.—[67] Hoffmann-La Roche Chemical Works, Ltd. (51, Bowes-road, N. 13), over and above the well-known Omnopon total opium alkaloids, Sedobrol sedative bouillon, exhibited a tasteless non-toxic aperient known as Isacen with the composition diacetyl-di-hydroxy-phenyl-isatin. They also supply Thyroxin.—[70] Reynolds and Branson, Ltd. (Leeds), had on view a large series of elixirs, liquors, syrups, and tablets along with a vaccine for rheumatoid arthritis.—[71] May and Baker, Ltd. (Battersea, S.W. 11), commenced an exhibit with Novarsenobillon, Metarsenobillon, Metarseno-argenticum, running on through Stovarsol, Tryparsamide, and Stovaine to a series of vaccines and other remedies.—[73] Allen and Hanburys, Ltd. (48, Wigmore-street, W. 1), in addition to the various Allenburys foods and the "Byno" series of tonics, showed a number of "Polyglandin" preparations, as well as Insulin, Chrismol, liver products, and a selection of sera and vaccines prepared by the Lister Institute.—[76] Evans, Sons, Lescher, and Webb, Ltd. (50, Bartholomew-close, E.C. 1), demonstrated specialties manufactured at Liverpool and Runcorn. The biological products included Hepatex, a convenient form of liver extract for oral administration, Hæmex, and Infundibulin; among pharmaceutical specialties was Bi-drox, a stable form of hydrogen peroxide.—[85] Parke, Davis and Co. (50, Beak-street, W. 1) had on view many preparations manufactured at their Hounslow laboratories, including Metatone, Alophen pill, and Cascara evacuant. Their standardised cod-liver oil contains in each fluid ounce at least 13,500 units of vitamin A and 3000 units of vitamin D. Gland preparations included Estrogen, an extract of reproductive gland tissue, standardised in terms of rat units; also Pituitrin, Pitocin, Pitressin, and a preparation known as Thio-Bismol for intramuscular injection which being water- and tissue-fluid soluble is painless.—[91] Hough, Hoseason and Co., Ltd. (Bridge-street, Manchester), showed pharmaceutical specialties including elixirs of Formasal, Uralia, Lecitone, and Cardiotone.—[97] C. J. Hewlett and Son, Ltd. (35, Charlotte-street, E.C. 2), had a large exhibit of original preparations including Antiseptic cream, Liquor santal, Mist. pepsinæ co., Mist. damianæ co., and Hormonigen.—[99] British Drug Houses, Ltd. (City-road, N. 1), illustrated their pioneer work in the synthesis of vitamin D and the manufacture from natural sources of vitamins A and B, with an exhibit of Radiostol, Radiostoleum, and Radio-Malt. Other products shown were Acetylcholine, Liver Extract, Ephedrine, and Thyroxine.—[108] Lambert Pharmacal Co. (St. Louis, Mo. Agents: S. Maw, Son and Sons, 7–12, Aldersgate-street, E.C. 1) exhibited Listerine Brand antiseptic and demonstrated its germicidal action on various bacteriological cultures.

2. *Special Drug Exhibits.*

[11] Reed and Carnrick (Jersey City, U.S.A. Agents: Coates and Cooper, 41, Great Tower-street, E.C. 3) offered samples of such glandular preparations as Peptenzyme, Nephritin, Protonuclein, Pancrobilin, and Trophonine.—[30] Bristol-Myers Co. (112, Cheapside, E.C. 2) offered Sal Hepatica, Ipana tooth-paste, and Ziratol, a non-toxic hæmostatic antiseptic.—[31] J. F. Macfarlan and Co. (32, Bethnal Green-road, E. 1) exhibited Opoidine, a British preparation of alkaloids of opium, and catgut ligatures in glass tubes in American style, prepared according to Lister's and other formulæ.—[32] Anglo-American Oil Company, Ltd. (Camden Town, N.W. 1), had on view three well-established preparations: Nujol, an intestinal lubricant, Mistol, a combination of menthol, camphor eucalyptol, and chlorbutol for use in an atomiser, and Flit, a liquid insectide in spray form.—[53] Bemax Sales, Ltd. (7, St. James's-street, S.W. 1), called attention to a natural vitamin food and tonic in highly concentrated form. A month's supply of Bemax for an adult costs 2*s.* 6*d.*—[54] Fassett and Johnson, Ltd. (86, Clerkenwell-road, E.C. 1), besides Angier's Emulsion, Bemax, and Californian Syrup of Figs, showed a large range of Seabury and Johnson's plasters.—[58] Kaylene, Ltd. (7, Mandeville-place, W. 1), offered a colloidally reversible hydrated silicate of alumina of great purity and other combinations of Kaylene, as well as Colonol Liquid Paraffin.—[60] Scott and Turner, Ltd. (Gallowgate, Newcastle-on-Tyne), showed Andrews Liver Salt, a pleasant saline aperient with brisk effervescence, leaving a clear solution.—[64] and [65] Deshell Laboratories, Ltd. (Braydon-road, N. 16), offered the Petrolagar Brand Emulsion, for the treatment of intestinal stasis, containing 65 per cent. of pure medicinal paraffin

atomised by hydraulic pressure and held by an emulsion of agar-agar. Four different formulæ are available.—[77] and [78] Armour and Co., Ltd. (St. Martin's-le-Grand, E.C. 1), had an exhibit of preserved glands in natural colours and offered Glanoid medicinal products of animal origin with a special demonstration of liver products.—[89] C. R. Harker, Stagg and Morgan, Ltd. (London, E. 1), offered their entirely British Petrolax, an emulsion containing 65 per cent. pure liquid paraffin of high viscosity, combined with agar-agar and free from starchy matter.—[95] Virol, Ltd. (Hanger-lane, Ealing, W. 5), besides their special combination of marrow fat, malt extract, eggs, lemon syrup, salts of lime and iron, showed also Virolax, a liquid paraffin containing 40 per cent. of virol, recommended for use in intestinal toxæmia and the disorders arising therefrom.—[101] The Regulin Syndicate, Ltd. (W. Bredt, 41, Great Tower-street, E.C. 3), offered Regulin (Helfenberg) for the regulation of intestinal function, consisting of agar-agar with 3½ per cent. extract of cascara; also Blutan, Pneumarol, and Valofin.

3. *Toilet Preparations.*

[57] Kolynos Inc. (Chenies-street, W.C. 1) presented their dental cream, containing antiseptic properties without grit, as well as a denture powder and a skin soap.—[88] The Pepsodent Co. (8, India-street, E.C. 3) offered a dentifrice with an acid reaction, due to the presence of fruit acids, and a polishing agent composed of tricalcium phosphate and calcium sulphate.

Food and Drink.

[5] H.A.G. Coffee Co., Ltd. (40, Theobalds-road, W.C. 1), demonstrated a caffein-free coffee, cleansed also of impurities such as wax, without affecting the flavour or aroma.—[9] Stower's (Alex. Riddle and Co., Ltd., Bancroft-road, E. 1) showed a lime-juice cordial, first introduced in 1862, with the newer concentrated unsweetened juice, as well as lemon- and orange-squashes.—[20] Montgomerie and Co., Ltd. (Ibrox, Glasgow), showed Berina foods for infants and invalids, and Bermaline bread.—[21] Saorstát Eireann (15, Regent-street, S.W. 1) had excellent samples of creamery butter, dried and condensed milk, honey, and eggs from the Irish Free State.—[25] Cow and Gate, Ltd. (Guildford), added to their usual display Lacidac, a lactic acid milk powder, and Hemolac, a milk food for the treatment of nutritional anæmia in infancy.—[27] Sister Laura's Infant and Invalid Food Co., Ltd. (Bishopbriggs, near Glasgow), invited the medical profession to sample a food to be used with fresh undiluted cow's milk.—[37] and [40] Nestlé and Anglo-Swiss Condensed Milk Co. (6, Eastcheap, E.C. 3), besides their standard milk, milk food, and pure thick cream, displayed Lactogen, a dried milk modified by the addition of lactose and made on modern principles.—[39] Ingram and Royle, Ltd. (45, Belvedere-road, S.E. 1), brought forward numerous imported mineral waters, including Vichy-Celestins, Contrexeville "Pavillon," Evian Cachat, Carlsbad, and Hunyadi János.—[51] Oxo, Ltd. (Thames House, Queen Street-place, E.C. 4), showed Oxo, Oxo Cubes, Hospital Oxo, and Lemco, along with three organic extracts Oxoid, Liveroid, and Splenoid.—[56] Maison Ackerman-Laurance (St. Hilaire-street, Florent, near Saumur, France) gave special prominence to their exhibit of sparkling Saumurs, whilst on the same stand Messrs. Francesco Cinzano (Turin) exhibited their Italian vermouth.—[59] Energen Foods Co., Ltd. (Willesden, N.W. 10), showed the Energen bread and other foods, originally prepared for diabetic patients, now designed for the dietary of other metabolic disorders; also a series of Energen cereals.—[79] Vitalia, Ltd. (17A, Boniface-street, Westminster Bridge-road, S.E. 1), called attention to a meat juice prepared by a cold process which retains the natural vitamins and organic salts.—[90] Benger's Food had its usual display jars, showing the special features of the food, along with other products such as Liquor pancreaticus, Liquor pepticus, and Liquor thyroidin.—[92] Plasmon, Ltd. (66A, Farringdon-street, E.C. 4), called attention to an analysis of Plasmona, a concentrated and easily assimilable food preparation containing lipoid, liver, and protein components; also to Splenex, a pure extract from the spleen of the calf.—[94] Cadbury Brothers, Ltd. (Bournville), gave free sample cups of Bournville cocoa and showed other interesting products of the chocolate industry.—[102] Hovis, Ltd. (Macclesfield), demonstrated the processes used in manufacturing their well-known flour and offered samples for tasting.—[105] Frank Cooper, Ltd. (Victoria Buildings, Oxford), described the manufacture of "Oxford" marmalade and fresh fruit preserves.—[107] Jewsbury and Brown, Ltd., exhibited their Citoda water, a special soda water for medical purposes. They supply non-alcoholic wines and cordials.—[113] William Gaymer and Son, Ltd. (Attleborough and London), had their usual exhibit of dry cyder made from English apples.

Surgical Instruments.

[6] Charles F. Thackray (Park-street, Leeds) had a compendious exhibit of instruments for abdominal and general surgery, with equipment of modern design for operating units.—[17] London Surgical Supply Co. (45, Church-road, N. 1) displayed a fine series of cystoscopes, sigmoidoscopes, urethroscopes, and bronchoscopes with a special collection of genito-urinary instruments, a large proportion of them being of stainless steel.—[22] Albert Browne, Ltd. (Chancery-street, Leicester), demonstrated Freund's new hysteroscope for detecting placental remains, and Zeiss's Evacuator for removal of fragments of stone under optical vision.—[24] Arnold and Sons (John Bell and Croyden, 50, Wigmore-street, W. 1) had on view every form of surgical equipment including their pedestal operation table on an oil-pump base, electrical instrument sterilisers, French's venesection apparatus, special syringes for varicose vein injection, and a series of ligatures and sutures subjected to strict bacteriological tests in their own laboratories.—[26] John Weiss and Son, Ltd. (287, Oxford-street, W. 1), displayed several new additions to their range of ophthalmic instruments and appliances, as well as equipment for the general surgeon, such as Robert Jones's bone instruments, Harrison's urethroscope, Putti's tourniquet, and Wilfred Harris's needles for trigeminal injection.—[28], [29], and [45] Mayer and Phelps (59, New Cavendish-street, W. 1) had a large selection of instruments and apparatus of original design for general and regional surgery, many in stainless steel. Popper's hæmostatic guillotine, an ingenious device crushing with 200 lb. pressure, and Lambert Rogers's skull plough with protective guard for the dura deserve special mention.—[41] F. C. Rein and Son (30, Charing Cross-road, W.C. 2) displayed their Diatonic Audiometer and an advanced type of hearing device known as the Viteron Compensator Model.—[47] Down Brothers, Ltd. (21, St. Thomas's-street, S.E. 1), had an exhibit covering the whole field of general and special surgery including Souttar's craniotomy instruments, Sinclair's instruments for fractures, Lane Joynt's skin-grafting instruments, Reavell Moseley electric suction apparatus, and much else.—[66] General Acoustics, Ltd. (77, Wigmore-street, W. 1), displayed Acousticon aids for the deaf with 50 different electrical types, each of which can be regulated in 110 degrees of volume.—[68] J. Gardner and Son (22, Teviot-place, Edinburgh) included in a comprehensive selection of instruments Fraser's laminotomy forceps, Wilkie's abduction splint, Douglas Guthrie's retractor and tongue forceps, and many others.—[72] Allen and Hanburys, Ltd. (48, Wigmore-street, W. 1), had on view the St. Bartholomew's Hospital latest model operation table with self-locking device and head clamp, instrument cabinets and tables in non-corrodible metal, and instruments for the introduction of radium needles and radon seeds.—[75] The Holborn Surgical Instrument Co., Ltd. (26, Thavies Inn,

E.C. 1), showed chrome-plated surgical instruments of all descriptions with electric diagnostic outfits and other devices.—[84] Billings and Sons, Ltd. (305, Oxford-road, Manchester), offered a number of improvements in surgical instruments and appliances such as Eve's Halometer, Wrigley's tonsil guillotine, Sankey's warm ether vapour apparatus, and Scannel's new apparatus for whole blood transfusion.—[96] R. H. Dent (309, Oxford-street, W. 1) displayed the latest models of the Ardente range of hearing aids.—[106] The Genito-Urinary Manufacturing Co., Ltd. (28A, Devonshire-street, W. 1), showed a range of special instruments, cystoscopes, lithotrites, and instruments for the application of radium.—[114] James Woolley, Sons and Co., Ltd. (Manchester), besides a large exhibit of galenicals, also showed surgeons' bags, stainless steel surgical instruments, blood transfusion apparatus, sterilisers, and syringes.

SURGICAL AIDS: HOSPITAL AND LABORATORY EQUIPMENT.

[2] The Dowsing Radiant Heat Co., Ltd. (91, Baker-street, W. 1), illustrated many medical applications of heat including the Ultradescent Luminous Heat Ray Appliance with vita-glass bulb. Their Subaqueous Bath fittings permit of airtight and watertight colonic irrigation free of smell.—[4] Restiform Specialities, Ltd. (Pembroke-place, Liverpool), demonstrated a hospital bed so constructed that the patient merely by his own movement can at will adjust the angle at which he is lying through seven positions.—[8] Whitfield's Bedsteads, Ltd. (109, Watery-lane, Bordesley, Birmingham), had a selection of "Lawson Tait" bedsteads and a special bed-lifter.—[14] Campoirette, Ltd. (252, Regent-street, W. 1), showed the Camp Physiological Supports for abdominal treatment.—[15] Antiphlogistine was displayed as the best-known method for the continuous application of moist heat. By osmosis and cutaneous stimulation it maintains the circulation and aids in eliminating toxins.—[16] Short and Mason, Ltd. (Macdonald-road, Walthamstow, E. 17), exhibited a series of accurately calibrated "Tycos" instruments—sphygmomanometer, thermograph, micro-barograph—as well as urinalysis glassware.—[34] Holophane, Ltd. (Elverton-street, S.W. 1), demonstrated the transmission by ultra-violet rays of Holviglass, which is colourless, permanent, and stronger than ordinary glass.—[42] Ronuk, Ltd. (Portslade, Sussex, and 16, South Molton-street, W. 1), showed their floor polish and preservative stain, together with weighted polishing brushes suitable for hospitals.—[43] Cambridge Instrument Co., Ltd. (45, Grosvenor-place, S.W. 1), laid emphasis on their Portable Electrocardiograph which weighs in all 110 lb. and has most of the virtues of the standard pattern.—[46] Chas. Hearson and Co., Ltd. (24, Fenchurch-street, E.C. 3), had a display of Research Apparatus, pathological, biological, bacteriological, and biochemical, and a good selection of well-known makes of microscope, and were demonstrating Venules.—[52] The Inhaling Drug and Apparatus Co., Ltd. (Windsor House, Victoria-street, S.W. 1), showed the Spiess-Drager apparatus for nebulising various medicaments in a current of oxygen, the diameter of the particles being in the neighbourhood of 10 μ.—[63] H. E. Curtis and Son, Ltd. (7, Mandeville-place, Wigmore-street, W. 1), exhibited their devices for securing the support of ptosed organs and various forms of hernia.—[74] J. Nesbit-Evans and Co. (Wednesbury, Staffs.) showed many kinds of bedstead, including the "Anti-accident" children's cot and the "Hey-Groves" Special orthopædic bedstead.—[81] and [82] The "Vita" Glass Marketing Board (Aldwych House, W.C. 2), describing their product as the only British window glass admitting the natural health-giving rays of sunlight, announced that already over 100 schools and nearly 200 hospitals have been fitted with it.—[98] Spencer Corsets, Ltd. (Banbury, Oxon., and 96, Regent-street, W. 1), had a variety of surgical supports and garments including a corset for the treatment of sacro-iliac strain.—[103] The Condensed Gas Co., Ltd. (171A, Oxford-road, Manchester), showed their novel "Titan-Ese" control valve for gas cylinders which is designed to eliminate all need for elaborate gas stands incorporating fine-adjustment devices. They offered facilities for making apparatus to the purchaser's design.—[112] Theodore Hamblin, Ltd. (15, Wigmore-street, W. 1), set out a large number of ophthalmological instruments and aids—among them the New Lister Morton ophthalmoscope, a convenient Harrison Butler hand slit-lamp, and a tubular resistance for using ophthalmoscopes from the main current. They also showed Speclettes, which are folding spectacles for the pocket.—[115] Kodak, Ltd. (Kingsway, W.C. 2), exhibited X ray negatives on "Dupli-tised" X ray film, together with dental film negatives and cinematographic apparatus and accessories for clinical photography.—[117] Philips Lamps, Ltd. (145, Charing Cross-road, W.C. 2), showed their "Metalix-Portable" X ray apparatus, which can be worked from any electric light socket. Among X ray tubes on view was a deep therapy tube, Type F, for operation at 220,000 volts and a miniature tube for skin therapy by the Bucky method.—[118] Messrs. Schall and Son, Ltd. (75, New Cavendish-street, W. 1), displayed a selection of the X ray and electro-medical apparatus which in their experience is most popular for cottage hospitals and general practice. Their Diathermy Special Surgical Model supplies a cutting current and is designed for the use of surgeons employing the electro-surgical technique described by Harvey Cushing and Wyeth.—[119] Hoskins and Sewell, Ltd. (Bordesley, Birmingham), drew attention to devices by which their hospital bedsteads have lately been improved. They showed a wheeling ward screen and a "Luxor" adjustable bedstead which can be used in seven different positions.

MISCELLANEOUS.

[1] The Medical Insurance Agency (B.M.A. House, Tavistock-square, W.C. 1) offered evidence of its expanding work and of the benefits obtainable by insuring persons or property under its auspices. Grants made to medical and other charities now amount to £22,980.—[44] The Food Education Society (29, Gordon-square, W.C. 1) described its work in arranging lectures and cookery demonstrations, and exhibited useful publications on dietetics and hygiene.—[55] The British Medical Bureau (12, Stratford-place, W. 1) set out advantageous terms on which it assists in the transference of practices and makes arrangements for locum tenents, resident patients, and accountancy.—[69] The Medical Sickness, Annuity and Life Assurance Society, Ltd. (300, High Holborn, W.C. 1), drew attention to their liberal sickness, accident, life, educational, and partnership assurance policies. The Society is now prepared to lend money for house purchase.—[83] The Hot Springs of Bath had an exhibit illustrating their manifold amenities, and [100] Harrogate called special attention to the systematic training of the staff of its bathing establishments.

Many of the principal medical publishers displayed copies of their new books and new editions.

HOSPITAL COÖRDINATION AT BRISTOL.—The Bristol Hospitals Representation Committee, which has been considering the best means of coördinating the work of the city's hospitals and medical institutions, has recommended the creation of a hospitals council. It is suggested that the functions of this body should be to collect and publish information as to the hospital needs of the area, the sufficiency of beds and finance, to prevent overlapping, to consider and criticise proposed extensions of existing and the erection of new hospitals, and to propose and advocate such extensions and erections. The scheme has been endorsed by the council of the Lord Mayor's Hospital Committee at a meeting at which Dr. R. A. Askins, the medical officer of health, stated that the Bristol hospitals were in some respects overlapping, and in others competing or not meeting the public demand.

Correspondence.

"Audi alteram partem."

AURAL DISEASE AND BATHING.

To the Editor of THE LANCET.

SIR,—In answer to the inquiry by "F.R.C.P." as to the "special measures to prevent excessive contamination of swimming baths," it may be stated that the system of continuous filtration, disinfection, and aeration provided by the various types of special plant installed for that purpose in a large number of the public baths in London and the provinces has gone far to meet the need for counteracting their pollution, as well as the call for economising the water-supply. Additional precautions, including the direct supervision of bathers before entering the bath, and attention to details of their personal cleanliness, such as are reported to be stringently applied in the United States, though affording further safeguard against risk of contamination, are probably considered too exacting for application in this country and likely to be strongly resented by the British bathing public. It is true that evidence as to the presence or absence of the *B. coli* group is regarded as supplying a convenient standard of bacterial pollution, in addition to the enumeration of the total organisms per c.cm. The standard recommended by the American Public Health Association is that they should not yield more than 1000 organisms per c.cm. after 24 hours' incubation at 37° C. in over 10 per cent. of samples of swimming bath water, with no single count of more than 5000 per c.cm., and the presence of *B. coli* in not more than two out of five samples of 10 c.cm. of water taken on the same day. Unless special investigations are required, particular attention is not usually paid to streptococcal contamination as a routine, although there is little doubt that its presence can be detected without difficulty in subculture tests from the primary plate cultures. As an example may be quoted a qualitative analysis,[1] made some years ago, of water from a small covered swimming bath, detailing the various organisms identified in an approximate count of 4000 colonies per c.cm. Subcultures from a number of scattered colonies showed that over 50 per cent. belonged to the proteus and *B. coli* groups, 12 per cent. were *Staphylococcus pyogenes aureus*, and 4 per cent. *Streptococcus fæcalis*, in addition to a similar proportion of a Gram-negative diplococcus (possibly *Micrococcus catarrhalis*), *Staphylococcus albus*, and *Sarcina lutea*. Chemical analysis also is helpful in affording evidence of degrees of pollution, and, especially when chlorination is used for disinfection, the estimation of the amount of available free chlorine, on account of its bactericidal action, can and should be regularly carried out by simple test, or by the use of the chloroscope, to ascertain that the necessary 0·2 parts per million free Cl is maintained.

The question of the prevention of pollution of swimming baths formed the subject of a detailed discussion at a meeting of the Medical Officers of Schools Association[2] in May, 1927, and was fully reported in the Association's annual report for that year. It is significant that, as compared with the attention paid to the safeguarding of the general public, precautions to ensure the hygienic condition of swimming baths in the great majority of our private and public schools leave much to be desired.

I am, Sir, yours faithfully,

August 3rd, 1929. J. GRAHAM FORBES.

[1] The Pollution of Swimming Baths, School Hygiene, 1912, iii., 79.

[2] See THE LANCET, 1927, i., 1143.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdr. A. B. Cox is placed on the Retd. List with rank of Surg. Capt.

ROYAL NAVAL VOLUNTEER RESERVE.

Surg. Sub.-Lt. E. H. Parkinson to be Surg. Lieut.

Proby. Surg. Lt. (D) W. R. Young to be Surg. Lt. (D).

The King has approved of the award of the Royal Naval Volunteer Reserve Officers' Decoration to Surg. Lt.-Comdr. J. Lorimer.

ROYAL ARMY MEDICAL CORPS.

Maj. W. B. Laird retires, receiving a gratuity.

Maj. T. H. Dickson retires on ret. pay.

Lts. G. Anderson, R. J. G. Hyde, and R. V. Franklin to be Capts.

ARMY DENTAL CORPS.

Capt. A. V. Milnes to be Maj.

ARMY RESERVE OF OFFICERS.

Army Dental Corps: H. Wade, late Capt., Ind. Army, to be Capt.

TERRITORIAL ARMY.

Lt. G. W. Robinson to be Capt.

S. Newsom to be Lt.

Capt. G. F. Wilson, having attained the age limit, relinquishes his commn.

Capt. Alexander Graham Bryce (late R.A.M.C.) to be Capt.

Capt. D. Stewart, from T.A. Res. of Off. (4th/5th Bn. R. Scots), to be Lt.

Lt. R. E. Rees (late 5th Bn. R.W. Fus.) to be Lt.

Supernumerary for service with O.T.C.—A. J. Parer to be Lt., supern. for serv. with Med. Unit, Univ. of London Contgt., Sen. Div., O.T.C.

TERRITORIAL ARMY RESERVE OF OFFICERS.

Lt. E. L. Hancock, from the Active List, to be Lt.

RESERVE OF AIR FORCE OFFICERS.

E. J. Mockler resigns his permanent commn. in the Royal Air Force and is granted a commission as a Flight Lt., Class D.i.

INDIAN MEDICAL SERVICE.

Lt. Mohan Lal Ahuja to be Capt.

Lt. (on prob.) F. W. H. Caughey to be Capt. (prov.) (on prob.).

Parliamentary Intelligence.

HOUSE OF COMMONS.

WEDNESDAY, JULY 24TH.

Grinding Wheel Closed at Sheffield.

Mr. HOFFMAN asked the Home Secretary whether his attention had been drawn to the closing of the Corporation-street grinding wheel in Sheffield, which had thrown out of employment 40 to 50 men; and what was the reason for this step taken by the factory inspector.—Mr. CLYNES replied: It is reported to me that the conditions at these premises have been very unsatisfactory, and in particular that some of the most important provisions of the Regulations for the grinding of cutlery and edge tools are not complied with. This Code of Regulations was made as long ago as 1925 to protect the workpeople from the grave danger of silicosis of the lungs; a period of three years was allowed before some of the Regulations became operative, so as to give owners and occupiers of premises an opportunity of making any necessary alterations in the ventilating and other arrangements, but notwithstanding this and repeated warnings from the factory inspector since January last, the owners of the property have not found themselves able to bring it into compliance with the law. In these circumstances the inspector came to the conclusion, which I think was fully justified, that he could not acquiesce in work being continued under these unsatisfactory conditions until the premises were put in order. I am glad to say, however, that the hon. Member would

appear to have been misinformed as to the number of persons likely to be thrown out of employment; the inspector reports not only that the number working there has been much smaller than 40, but that most of these are obtaining, or have obtained, places elsewhere, and that so far as he can judge only three or four are still seeking places.

THURSDAY, JULY 25TH.

Nursery Schools.

Lady CYNTHIA MOSLEY asked the President of the Board of Education whether he could state plans for the more general extension of nursery schools; and whether he proposed to ask for powers to require local authorities to establish nursery schools in their areas.—Sir CHARLES TREVELYAN replied: I am considering the best way of securing an extension of nursery schools, but I cannot make any definite statement before the House rises for the recess.

Contagious Abortion and Malta Fever.

Mr. GUINNESS asked the Minister of Agriculture whether his attention had been drawn to evidence recently published connecting outbreaks of undulant or Malta fever in human beings with the consumption of milk from cattle suffering from contagious abortion; and whether he would take any action to clear this matter up, either by veterinary research or in conjunction with the Medical Research Council.—Mr. BUXTON replied: I understand that the Ministry of Health will shortly issue a report containing the evidence, mainly obtained abroad, on which is based the theory that a form of undulant fever is caused by the bacillus which produces abortion in animals. The publication of this comprehensive report will attract the attention of medical and veterinary practitioners and research workers to the study of this question on which so far as this country is concerned there is at present very little information.

Hospitals and Motor Accidents.

Mr. LOUIS SMITH asked the Minister of Transport whether, in view of the accumulation of accidents directly or indirectly due to motor traffic which had to be treated in the hospitals of the country, often to the exclusion of local patients, he would investigate the possibility of legislation aimed at permitting such hospitals to recover expenses as in the analagous case provided by Section 16 of the Local Government Act, 1929, or by some earmarked addition for the benefit of the hospitals to the statutory motor licence or driver's licence.—Mr. HERBERT MORRISON replied: I am advised that Section 16 of the Local Government Act, 1929, applies to hospitals maintained by local authorities. I do not think that it would be practicable to apply similar provisions to other hospitals or to impose an additional statutory charge for drivers' licences with a view to dividing the proceeds among them.

Manufacture of Vaccine Lymph.

Mr. GROVES asked the Minister of Health if he would supply particulars of the various changes which had been made in the manufacture of vaccine lymph issued by his department since the system of public arm-to-arm vaccination was abandoned.—Mr. GREENWOOD replied: My hon. friend will find a full statement on the technique and procedure adopted in the preparation of vaccine lymph in the Report of the Vaccination Committee, 1928, pp. 15–17.

Vaccination.

Mr. BROAD asked the Minister of Health whether he was prepared to guarantee that any child or person vaccinated with Government lymph would not be seriously injured by the operation; and, if it was not possible, whether he would consider the desirability of introducing legislation to secure that compensation should be given in such cases to the parents or dependents, as the case might be.—Mr. GREENWOOD replied: It is impossible to give an absolute guarantee that no person vaccinated with Government, or any other, lymph will suffer injury, but I may point out that the lymph produced by the Government Lymph Establishment complies in all respects with the standards laid down in the regulations made under the Therapeutic Substances Act. As regards the second part of the question, as at present advised, I could not undertake to introduce legislation on this subject.

Mr. BROAD asked the Minister of Health when rabbits first began to be used in the production of Government lymph supplies; whether any cases of post-vaccinal encephalitis were reported in this country prior to such introduction of rabbits; and whether his medical advisers had considered the desirability of dispensing with the use of rabbits for the purpose in question.—Mr. GREENWOOD replied: Rabbits have been systematically used for this purpose since 1902. No case of post-vaccinal encephalitis was reported in this country until December, 1922. As regards the last part of the question, the desirability of dispensing with the use of rabbits has been considered, but it was not deemed necessary to recommend any change in the present practice.

Pollution of the River Lea.

Major CHURCH asked the Minister of Health whether he was aware that the River Lea from Tottenham lock downwards through the districts of Hackney and Homerton was, and had for many years been, in a foul condition; and whether, as this stretch of the river was a menace to the health of residents near its banks, he would take steps to ensure that the river was restored to a reasonable standard of purity.—Mr. GREENWOOD replied: Several large schemes of sewerage and sewage disposal have been carried out at heavy cost in recent years by local authorities with a view to improving the condition of the river. I am arranging for a visit of inspection in the near future.

Report on River Pollution.

Rear-Admiral BEAMISH asked the Minister of Agriculture whether the report of the Standing Committee on River Pollution, which the Ministry undertook to issue after a decision reached in February, 1928, could now be issued.—Mr. BUXTON replied: The preparation of this report involves an analysis of a large number of river surveys. I anticipate that the draft report will be ready for the consideration of the Standing Committee in the autumn, and the review of river surveys will include those carried out in 1928.

Water Supplies.

Sir WILLIAM DAVISON asked the Minister of Health whether, in view of the menace to the health of London through an impending shortage of water in London, he would make an inquiry as to the amount of water available; and what, if any, restrictions in the use of water were immediately required or contemplated.—Mr. GREENWOOD replied: I am assured that no serious shortage of water in London is to be expected, because of the large storage capacity which has been provided by the Metropolitan Water Board. The restrictions now in force have been imposed because of the very large increase in consumption and to prevent possible difficulties of distribution in certain areas. I understand that no further restrictions are contemplated.

Removal of Panel Practitioners.

Mr. DAY asked the Minister of Health whether he could give the reasons for the removal of the 46 insurance practitioners who had been removed from the medical list since 1913.—Mr. GREENWOOD replied: The reason in each case was that the Minister was satisfied after the prescribed inquiry that the continued inclusion of the practitioner in the medical list would be prejudicial to the efficiency of the medical service of the insured.

War Pensioners and Tuberculosis.

Mr. DAY asked the Minister of Pensions the number of war pensioners suffering from tuberculosis who were at present receiving treatment in sanatoria, and the number of such cases that were in sanatoria attached to a village settlement.—Mr. F. O. ROBERTS replied: The total number of pensioners at present receiving treatment in sanatoria is 1044, of whom, so far as can be ascertained, 68 are in sanatoria attached to village settlements.

Food Council and Milk Prices.

Mr. WISE asked the President of the Board of Trade what was the view of the Food Council concerning the 80 per cent. to 100 per cent. margin over the farmers' prices to be charged by the milk combine and other distributors under the scheme now under consideration; and what he proposed to do.—Mr. W. GRAHAM replied: The scheme under consideration is a complicated one, designed to apply to the milk trade throughout both England and Wales. The Food Council consider it necessary to consult the associations of milk distributors in order to have the details more clearly before them, and the matter will accordingly be discussed with those associations as soon as practicable. The scheme, if approved, would not in any case come into force until Oct. 1st.

All-India Medical Council.

Major GRAHAM POLE asked the Secretary of State for India if the Government of India had made any progress towards the establishment of an All-India Medical Council; and why no steps had been taken to appoint a government commissioner of medical qualifications and standards despite the fact that this appointment was provided for in the existing law and had been approved in principle by the central and provincial governments.—Mr. BENN replied: The Government of India recently convened a conference of representatives of provincial governments to consider

the proposal to create an All-India Medical Council. I have not yet received a report of the conference. I hope to be able shortly to make an announcement regarding the appointment of a Commissioner of Medical Qualifications and Standards.

Removal of Trade Refuse.

Sir GEORGE HAMILTON asked the Minister of Health whether, in view of the divergence of opinion as to the correct definition of trade refuse, he would consider the question of amending Section 42 of the Public Health Act, 1875, and Section 48 of the Public Health Acts (Amendment) Act, 1907, to permit a local authority to treat refuse from shops under the same heading as house refuse and to collect it without charge, thus altering the present situation whereby the refuse from one shop was house refuse and from another shop trade refuse.—Mr. GREENWOOD replied: This matter has already been noted for consideration when an opportunity occurs to amend the Public Health Acts.

Eyesight Injuries in Engineering Workshops.

Mr. JAMES WILSON asked the Home Secretary whether he was aware of the injury caused to the eyesight of employees in engineering workshops through the lodgment of foreign matter in the eye; and whether he would make arrangements for the appointment of an eye specialist in engineering towns, at which such employees could receive treatment on production of their medical card.—Mr. CLYNES replied: I am aware of the liability to eye injuries in many engineering processes, and the first-aid arrangements which are required to be made at every factory provide for the first-aid treatment of these injuries. Arrangements, however, for the provision of any specialist treatment which may be necessary subsequently are outside the scope of the Factory Acts, and all I can offer is to bring the hon. Member's suggestion to the notice of my right hon. friend, the Minister of Health.

Health of Metropolitan Police Constables.

Lieut.-Colonel HENEAGE asked the Home Secretary the hours of employment of police constables of the Metropolitan police on traffic duty; and the number of cases of illness or overstrain which had resulted from these hours.—Mr. CLYNES replied: The duty period is eight hours with a break of half an hour for refreshments. I am informed that there is no evidence of cases of illness or overstrain resulting from the length of the duty period.

Miners and Anthracosis.

Mr. HOPKIN asked the Secretary for Mines if he would assure miners who suffered from anthracosis that they would have compensation at least to the same extent as those who suffered from silicosis and under the same conditions.—Mr. CLYNES replied: By anthracosis I understand the hon. Member to mean the blackened condition of the lungs which is sometimes caused by inhalation, over a considerable period, of coal dust. I have at present no evidence that this condition disables the workman, but an inquiry is in progress under the direction of the Health Advisory Committee of the Mines Department, and the matter will be further considered when the results of this inquiry are available.

THE LATE DR. STANLEY BOTT.

WE have already recorded the death of Dr. Stanley Bott, at the age of 50, after a long period of indifferent health. He was a student of the London Hospital, which he entered in 1900. Qualifying as M.R.C.S. five years later he visited Australia as a ship's surgeon, and then undertook a series of house appointments at Dorchester, Reading, and finally at the Westminster Hospital, where he was resident obstetric officer. With this experience behind him he took over a practice at Caistor in Lincolnshire, in a scattered agricultural district. He had few interests outside his work, on which he was extremely keen, and though a somewhat reserved nature prevented his making many friends, his services were deeply appreciated by patients, whilst his knowledge and solid virtues were appreciated by his colleagues. In 1921, Dr. Bott took the M.D. degree of Durham University. During the war, however, he had been over-burdened by extra duties, and in 1923 he had a serious breakdown in health, and was obliged to give up his professional activities. For the past year or two he had been living at Broadstairs. He leaves a widow.

Medical News.

ROYAL COLLEGE OF PHYSICIANS OF LONDON AND SURGEONS OF ENGLAND.—As the result of the Final Examination, held from July 1st to 24th, the following candidates were approved in the undermentioned subjects, but are not eligible for the diplomas of the Colleges:—

Medicine.—S. Ahmad, Punjab and London; H. S. Atkinson, London; G. O. Barber, Cambridge and St. Mary's; J. E. L. Bendor-Samuel, London; J. H. Bentley, Univ. Coll.; J. G. Bowen, London; G. G. Cameron, Guy's; A. Caplan, St. Bart.'s; G. J. Clarke, Guy's; H. O. Clarke, Dublin; H. W. Davies, King's Coll.; L. Farris, Liverpool and Charing Cross; Doreen P. Firmin, Cambridge and Westminster; J. F. Fisher, St. Bart.'s; A. M. Fratel, Newcastle-on-Tyne; H. S. H. Gilmer, St. George's; R. McN. Glover, Westminster; P. E. Glynn, Leeds; M. B. W. Gray, London; A. Guirdham, Oxford and Charing Cross; Verna Hackett, Westminster; Kathleen M. L. Hall, Royal Free; Cicely L. Hingston, St. Mary's; Mary A. Hughes, Charing Cross; Eugenie C. Illingworth, Leeds; K. S. Keele, Guy's; N. F. Kendall, St. Bart.'s; Mary L. R. Kennard, St. Mary's; E. J. Kerr, Birmingham; A. H. Lendon, Adelaide; A. Lister, London; W. D. Lovelock-Jones, Cardiff and Univ. Coll.; H. S. A. Malik, St. Thomas's; F. N. Marshall, Manchester; P. H. Merlin, Birmingham; Ruth Milne, Royal Free; C. W. Morley, Cambridge and St. Mary's; J. N. O'Reilly, Middlesex; I. E. Phelps, St. Bart.'s; N. L. Price, Bristol; D. S. Raju, Guy's; C. R. Salkeld, St. Thomas's; L. Savronsky, London; S. Scher, Univ. Coll.; K. M. Seedat, Bombay and Charing Cross; Violet R. Sharp, Royal Free; G. C. Sheldon, King's Coll.; C. H. Sherwood, Birmingham; T. Singh, Punjab and Charing Cross; L. A. H. Snowball, King's Coll.; H. J. Stracey, St. Thomas's; J. M. Thomas, Cardiff and Univ. Coll.; V. Thorne-Thorne, Cambridge and St. Bart.'s; and Eileen A. L. Webb, Royal Free.

Surgery.—S. G. Allen, London; G. H. Bateman, King's Coll.; T. S. Belcher, J. E. L. Bendor-Samuel, and J. G. Bowen, London; W. D. Brown, Cambridge and London; P. C. Chakravorty, Middlesex; Rosa E. Chamings, Royal Free; J. L. Clapham, St. Thomas's; A. H. Clegg, Leeds; S. C. S. Cooke, Middlesex; H. D. Cronyn, St. Mary's; T. Davies, St. Bart.'s; N. R. Donald, Liverpool; A. N. Duggal, Lahore; R. M. Ealand, Bristol; A. Eckford, Guy's; L. Gabbé, Cape and Guy's; R. M. Glover, Cambridge and Westminster; P. E. Glynn, Leeds; M. B. W. Gray, London; A. H. Gurney, Cambridge and St. Bart.'s; Y. A. A. Hammouda, Cairo and St. George's; R. D. Harding, King's Coll.; C. C. Harvey, Cardiff and Univ. Coll.; E. Harvey, Middlesex; Columba M. D. Heathcote, Charing Cross; C. F. Hecker, Adelaide and London; L. Hershfield, Middlesex; P. Y. Hicks, St. Thomas's; H. B. Jackson, Middlesex; W. D. G. James, Cardiff and St. Mary's; J. L. Jekyll, Cambridge and London; H. Y. Khwaja, London; A H. Lendon, Adelaide; E. L. Littler and R. W. McConnel, King's Coll.; G. K. McKee, St. Bart.'s; E. J. Mann, Birmingham; E. Marks, St. Mary's; Eileen M. Massey, King's Coll.; E. C. W. Maxwell, St. Thomas's; F. C. Mayo, King's Coll.; P. H. Merlin, Birmingham; L. B. Neel, St. George's; J. E. Newton, Bristol; J. N. O'Reilly, Middlesex; A. P. M. Page, St. Bart.'s; B. W. Paine, Univ. Coll.; L. H. Peiris, Ceylon and King's Coll.; J. Petro, St. George's; J. R. F. Popplewell, Guy's; N. L. Price, Bristol; H. Ramsay and J. Richardson, Middlesex; N. D. Sane and L. Savronsky, London; J. G. Scadding, Middlesex; S. Scher, Cape and Univ. Coll.; D. P. Settna, London; T. M. Spilhaus, St. Thomas's; H. H. L. Spitz, Leipzig and Middlesex; R. Stanley, N. Stevens, and H. J. Stracey, St. Thomas's; A. Taylor, Manchester; D. M. Thomas, Cardiff and Middlesex; E. G. Thomas, Univ. Coll.; K. S. Thompson, London; T. F. Tierney, St. Bart.'s; C. Wall, London; E. M. Ward, St. Bart.'s; V. W. L. Wells, Guy's; L. H. Wharton, Bristol; A. J. White, Middlesex; E. R. Willis and B. Yuill, London.

Midwifery.—W. Addey, Manchester; A. M. M. M. Ali, Middlesex; J. E. G. Baker, London; J. C. Banerjea, Calcutta; A. Barber, St. Bart.'s; G. O. Barber, Cambridge and St. Mary's; J. H. Bartlett, St. Mary's; F. Bartholomew, St. Thomas's; A. K. Basu and J. H. Bentley, Univ. Coll.; M. V. Bhajekar, Middlesex; I. Billig, St. Thomas's; S. Bochenek, St. Bart.'s; C. C. Bryson, Cambridge and Middlesex; D. R. Buchan, Birmingham; A. Burkhardt, Univ. Coll.; C. L. Carter, St. Bart.'s; H. M. Chappel, Univ. Coll.; F. W. Chippindale, Guy's; L. P. Clarke, St. George's; A. F. H. Coke, St. Mary's; H. Coorland, St. Bart.'s; W. H. Croft, Birmingham; T. Davies and A. F. Davy, St. Bart.'s; A. L. Devi, Royal Free; A. N. Duggal, Lahore; M. P. Ellis, Univ. Coll.; E. H. Evans, Univ. Coll.; R. E. M. Fawcett, St. Bart.'s; C. L. Ferguson, London; Catherine F. Forrest, Royal Free; R. H. Franklin St. Thomas's; A. M. Fratel, Bombay and Durham; J. D. J. Freeman and A. J. Gibbs, St. Thomas's; R. T. S. Goodchild, London; D. R. Goodfellow, Manchester; C. G. Gordon-Wilson, and R. K. Goyal, London; A. H. Grace, St. Bart.'s; P. R. Graves, St. Thomas's; Charlotte Gray, Univ. Coll.; Verna Hackett, Westminster, R. H. Hadley, Melbourne; B. Halfpenny, Middlesex; C. J. K. Hamilton, Liverpool; C. C. Harvey, Univ. Coll.; E. Harvey, Middlesex; Rowena M. Hickman, Bristol; Ciceley L. Hingston, St. Mary's; F. K. S. Hirschfeld, Melbourne and London;

B. Horwitz, Cape and London; E. N. Jenkinson, St. Bart.'s; G. L. Johnson, Columbia Univ.; E. K. Jones, London; H. J. Knight, St. Mary's; L. J. Lannaman, St. Bart.'s; P. Lansel, Middlesex; J. B. Lloyd, London; S. McDonald, Durham; J. S. MacVine, St. Bart.'s; Margery L. Maltby, Royal Free; I. W. H. Mansfield, Middlesex; F. N. Marshall, Manchester; F. C. Mayo, King's Coll.; B. R. Medlycott, Guy's; C. W. Morley, St. Mary's; I. B. Morris, Guy's; P. D. Mottet, Univ. Coll.; F. Murray, London; J. E. Newton, Bristol; T. R. Pahwa, Glasgow; C. H. Pauli, Bristol; D. D. Payne, St. Thomas's; W. Phillips, Univ. Coll.; J. O. Poynton, Charing Cross; L. D. Pringle and D. S. Raju, Guy's; H. Ramsay and G. E. Ranawake, Middlesex; P. V. Reading, Guy's; J. M. Reese, St. Mary's; J. I. Rerrie, St. Bart.'s; Colleen Rice, Charing Cross; J. Richardson, Middlesex; J. F. Riches, St. Thomas's; A. H. T. Robb-Smith, St. Bart.'s; T. G. Robinson and L. K. Robson, Guy's; K. M. Ross, St. Bart.'s; J. G. Scadding, Middlesex; S. Schenkman and A. Scher, London; M. Schlaff, St. Bart.'s; J. M. Searle, London; H. Silverstein, St. Bart.'s; C. Skinner, Guy's; Edith M. P. Smith, Charing Cross; B. T. Squires, Guy's; J. E. S. Stephens, St. Bart.'s; A. E. Stevens, London; F. H. Stevenson, Guy's; T. S. Stone, London; G. L. Stroud, St. Mary's; R. F. Taaffe-Finn, St. Bart.'s; K. T. Taskar, London; R. S. Taylor, Middlesex; E. G. Thomas, Univ. Coll.; W. E. Thomas, Cardiff and Bristol; T. F. Tierney, St. Bart.'s; C. Wall, London; Mary J. Westall, Royal Free; A. J. Whitaker, Univ. Coll.; V. M. White, London; T. H. N. Whitehurst, St. Bart.'s; E. G. Wilkins, Middlesex; D. A. Williams, Cardiff and Univ. Coll.; R. C. Williams, St. Thomas's; Rose E. Williams, Royal Free; and T. H. Wilson, St. Thomas's.

Pathology.—E. F. Adams, Manchester; J. E. G. Baker, London; F. Bartholomew, St. Thomas's; A. Burkhardt, Univ. Coll.; F. W. Chippindale, Guy's; A. F. H. Coke, St. Mary's; P. Frankenberg, St. Bart.'s; E. J. Goldsmith, St. Thomas's; R. T. S. Goodchild, London; P. R. Graves and P. Y. Hicks, St. Thomas's; S. W. Holmes, St. Mary's; O. Ive, Guy's; E. K. Jones, London; H. J. Knight, St. Mary's; F. P. L. Lander, Middlesex; L. J. Lannaman, St. Bart.'s; P. A. T. Lowden, St. Thomas's; J. S. MacVine, St. Bart.'s; J. H. G. Mason, Middlesex; I. W. Matheson, St. Bart.'s; J. E. L. Morris, Liverpool; P. D. Mottet, Univ. Coll.; J. M. Reese, St. Mary's; D. Y. Richardson, Durham; H. Silverstein, St. Bart.'s; T. S. Stone, London; Marjorie V. N. Sudds, Royal Free; W. E. Whaite, Manchester; A. J. Whitaker, Univ. Coll.; and T. H. Wilson, St. Thomas's.

THE Royal College of Physicians of London will be closed for the summer vacation from August 12th to Sept. 14th, inclusive.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—An ordinary meeting of the Council was held on August 1st, with Lord Moynihan, the President, in the chair.

Dr. Aly Ibrahim, Dean of the Faculty of Medicine, Cairo, who was elected an Honorary Fellow in November last, attended and signed the Roll of Honorary Fellows.

On the recommendation of the Museum Committee, it was decided to establish a research scholarship of £500 per annum, payable out of the general funds of the College, tenable from year to year, for a period not exceeding seven years.

Membership of the College was conferred on 141 of those whose names appeared on p. 257 of THE LANCET last week, and upon Marjorie E. Roberts, Royal Free Hospital. Diplomas were granted jointly with the Royal College of Physicians, according to the list published on the same page.

The King of Egypt paid a visit to the College on Aug. 2nd, and was made an Honorary Fellow. Lord Moynihan, the President, on presenting the Diploma, referred to the College's close connexion with the Egyptian School of Medicine. Fellows and Members of the College had been teachers in the School, and until recently the post of Dean had been held by an English Fellow. The present Dean, Dr. Aly Ibrahim, had not long ago been made an Honorary Fellow, and within recent years nine Egyptians, trained in the School at Cairo, had become Fellows by examination. He also referred to the great personal interest taken by His Majesty in the Faculty of Medicine at Cairo, and the Kasr-el-Aini Hospital. King Fuad, having signed the Roll of Honorary Fellows, inspected the Museum and other parts of the building.

A MEMORIAL NURSES' HOME.—Princess Mary last week opened a new nurses' home at the Royal West Sussex Hospital, Chichester, which has been built as a memorial to the late Dr. David Ewart, who was for many years associated with this institution as surgeon. The Princess also unveiled a memorial to Dr. Ewart.

A WELSH MATERNITY HOSPITAL.—A maternity hospital is being added to the Montgomeryshire Infirmary, at Newtown, and when the foundation-stone was laid last week by Mrs. David Davies, it was stated that this is the first institution of the kind in Mid-Wales.

EPSOM COLLEGE.—On every recent Founder's Day at Epsom College there has been a steady record of progress, showing that the intimate connexion of the school with medicine is associated with advance in the general status of the College as a public school. Proceedings this year were no exception to the rule. Prior to the prize-giving, the Council entertained 150 guests at luncheon, and over a thousand parents and friends of the College were present on Saturday, July 27th, when Lord Eustace Percy gave away the prizes. In doing so he took as the main point of his address to the boys the need for understanding one's fellow men and women—that he held to be the prime point in what he understood by the word "education." General education meant getting to know men and women, to know the minds of men and women, to sympathise with them, and in the fullest sense to understand them. The world would not fail for lack of specialists, but it might very well fail for lack of people with simple human understanding and the power of handling other fellows. That was the cement that kept society together, and in this country they never needed it more than to-day.

The Headmaster, Mr. Arnold Powell, having detailed the successes of the school during the past year in examinations, Dr. Raymond Crawfurd, Chairman of Council, in moving a vote of thanks to Lord Eustace, referred to the business side of the school's affairs. The scale of masters' salaries, he said, had been considerably increased during the present year, additions had been made to the dietary, and many improvements had been effected for the well-being of the boys, such as alterations in the swimming bath, the provision of an electrolyser for disinfection, the building of a new changing room for one of the houses, the utilisation of Lord Beaverbrook's donation for the furtherance of scientific education, and the provision of a new cricket practice pitch, the gift of Mr. Chudleigh. Referring to changes to take place in the immediate future, he mentioned the building of a new rifle-range, and considerable structural alterations at Wilson House. He hoped, finally, that the building of the new sanatorium would not long be delayed, as, with its completion, the Council would consider their main plans of enlargement to have been brought to a successful conclusion.

During the afternoon the present generation administered a sound hiding to the Old Boys on the cricket field. They declared their first innings closed on the Friday with the fine score of 370 for 3 wickets, to which the Old Boys replied with 302 all out. The College again declared with 210 for 3, and the Old Boys could only total 178 in reply. J. D. W. H. Pettigrew, in the first innings, scored 186 not out for the school, giving only one chance, and C. S. Taylor hit hard in each innings for 83 and 52 not out respectively.

On Saturday evening the College Dramatic Society gave a performance of Mr. Bernard Shaw's "St. Joan."

THE Minister of Health has appointed Mr. H. W. S. Francis to be a Principal Assistant Secretary, and Mr. R. H. H. Keenlyside and Mr. J. N. Beckett to be Assistant Secretaries of the Ministry.

METROPOLITAN ASYLUMS BOARD.—A three months' course of lectures and demonstrations on clinical practice and in hospital administration will be given at the North-Eastern Hospital, St. Ann's-road, Tottenham, N.15, by Dr. F. H. Thomson, the Medical Superintendent, on Mondays and Wednesdays at 4.45 P.M., and alternate Saturdays at 11 A.M., beginning on Wednesday, Oct. 2nd. Particulars may be had from the Clerk to the Board, Victoria Embankment, E.C. 4.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—A special course in Diseases of Children will be given at the Queen's Hospital for Children from August 12th to 21st. It will occupy the whole of each day with demonstrations, operations, and lectures. Courses in September will be held as follows: Diseases of the chest, Brompton Hospital, Sept. 9th to 14th; diseases of infants, Infants Hospital, Sept. 9th to 21st; psychological medicine, Bethlem Royal Hospital, Tuesday and Saturday mornings, from Sept. 10th to Oct. 5th; medicine, surgery, and the specialties, Westminster Hospital, for men graduates only, Sept. 16th to 28th. An experimental all-day course in gastro-enterology will be given at the Prince of Wales's Hospital, Tottenham, from Sept. 30th to Oct. 4th. Post-graduates interested are asked to apply early for the syllabus. The Metropolitan Hospital, Kingsland-road, will give an experimental all-day course in medicine, surgery, and the specialties, from Oct. 21st to Nov. 2nd. A course for the M.R.C.P., Lond. examination will be given at 8.30 P.M. on Tuesday and Friday evenings, from Oct. 15th to Dec. 6th, at 11, Chandos-street, Cavendish-square, W. Full particulars of all courses are obtainable from the Secretary of the Fellowship, at 1, Wimpole-street, London, W. 1.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, August 12th, to SATURDAY, August 17th.—QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, Bethnal-green, E. Special Course in Diseases of Children, Demonstrations, Operations and Lectures. All day Course.—ALL SAINTS' HOSPITAL, Vauxhall Bridge-road, S.W.—Special Course in Urology. Afternoons and evenings.—Further particulars from the Fellowship of Medicine.

Appointments.

JAMESON, R. C., M.D., C.M.Edin., has been appointed Certifying Surgeon under the Factory and Workshop Acts for Leeds North District.

RAWSON, W. F., F.R.C.S. Edin., Hon. Surgeon to the Waddilove Samaritan Hospital for Women, Bradford.

Vacancies.

For further information refer to the advertisement columns.

Barnsley, Beckett Hospital and Dispensary.—H.P. £140.

***Birkenhead General Hospital.*—Cas. S. £100.**

Bolingbroke Hospital, Wandsworth Common, S.W.—H.S. At rate of £120.

Bournemouth, Royal Victoria and West Hants Hospital.—H.S. At rate of £120.

Bradford Children's Hospital.—H.S. and H.P. Each £120.

***Bradford, Royal Eye and Ear Hospital.*—Jun. H.S. £120.**

Burnley, Victoria Hospital.—H.P. £125.

***Burton-on-Trent, General Infirmary.*—2nd Res. H.S. £150.**

Cardiff, King Edward VII. Welsh National Memorial Assn.—Area Asst. Tuber. Physician. £600.

Cardiff City Mental Hospital, Whitchurch.—Res. Clin. Asst. 50 gns.

Carlisle, Cumberland Infirmary.—H.P. Also H.S. to special Departments. Each at rate of £155.

***Cheshire Joint Sanatorium, Market Drayton, Salop.*—H.P. £250.**

Cheshire, Royal Hospital.—Asst. M.O. £350.

Dewsbury County Borough.—Asst. School M.O. and Asst. M.O.H. £600.

East London Hospital for Children, &c., Shadwell, E.—Res. H.S. and H.P. Each at rate of £125.

***Exeter, Royal Devon and Exeter Hospital.*—Asst. H.S. At rate of £100.**

General Lying-in Hospital, York-road, S.E.—Res. M.O. At rate of £100.

Glasgow, Govan District Asylum.—Jun. Asst. M.O. £325.

Golden Square Throat, Nose and Ear Hospital, W.—H.S. £100.

Harrogate Infirmary.—Sen. and Jun. H.S.'s. At rate of £150 and £100 respectively.

Hull Royal Infirmary.—Second H.S. At rate of £150. Also Cas. H.S. At the rate of £130.

Ilford Emergency Hospital.—Hon. Aural S. Also Sen. H.S. £150.

Inverness, Northern Infirmary.—H.P. and Jun. H.S. £100.

***Ipswich, East Suffolk and Ipswich Hospital.*—H.S. At rate of £120.**

Jewish Maternity Hospital, Underwood-street, E.—Res. M.O. At rate of £50.

Leicester, North Evington Infirmary.—Res. M.O. £250.

Lincoln, Bracebridge Mental Hospital.—3rd Asst. M.O. £350.

***Liverpool Open Air Hospital for Children, Leasowe.*—Jun. Res. M.O. At rate of £200.**

Liverpool, St. Paul's Hospital, Old Hall-street.—H.S. £100.

***London Female Lock Hospital, 283, Harrow-road, W.*—H.S. At rate of £150.**

London Temperance Hospital, Hampstead-road, N.W.—Cas. O. At rate of £120.

***Lowestoft and North Suffolk Hospital.*—H.S. £120.**

Manchester and District Radium Institution.—Asst. Radiologist. £250.

Manchester Victoria Memorial Jewish Hospital.—Sen. H.S. £250. Also Jun. H.S. At rate of £125.

Milford, Surrey County Sanatorium.—2nd Asst. M.O. £400.

Miller General Hospital, Greenwich-road, S.E.—Cas. O. At rate of £150.

Nottingham General Hospital.—Asst. Res. Cas. O. At rate of £150.

Nottingham Children's Hospital.—Res. H.S. At rate of £150.

Portsmouth Royal Hospital.—Cas. O. At rate of £100.

Richmond Royal Hospital.—Jun. H.S. £100.

Rochester, St. Bartholomew's Hospital.—H.P. At rate of £175.

Rotherham Hospital.—H.P. £180.

Royal Air Force Medical Service.—Temporary Commissions.

Royal Eye Hospital, St. George's-circus, S.E.—12 Salaried Refractionists. 12 Clinical Assts. Also 1 Pathologist.

Royal Waterloo Hospital for Children, &c., Waterloo-road, S.E.—Clin. Assts.

St. Mary's Parish Infirmary, Highgate-hill, N.—Radiologist. £125.

Scarborough Hospital and Dispensary.—Two H.S.'s Each at rate of £126.

Sheffield, Jessop Hospital for Women.—Sen. Res. O. £250.

Swansea Hospital.—H.S. £150.

Swindon and North Wilts Victoria Hospital.—Hon. Aural Surg.

***University College Hospital, Gower-street, W.C.*—Asst. Radiologist. £200.**

Warwickshire, King Edward VII. Memorial Sanatorium.—Sen. H.P. and Jun. H.P. At rate of £275 and £200 respectively.

Weston-super-Mare, Queen Alexandra Memorial Hospital.—Res. M.O. £130.

West Bromwich and District General Hospital.—H.S., H.P., and Cas. H.S. Each at rate of £200.

***West Riding of Yorkshire.*—County M.O.H. £1600.**

Wigan County Borough.—Clin. Tuber. O. and Asst. M.O.H. £750.

Winchester, Royal Hampshire County Hospital.—Res. H.S. £150.

***Woolwich and District War Memorial Hospital, Shooters' Hill, S.E.*—Jun. H.S. At rate of £125.**

The Chief Inspector of Factories announces vacant appointments for Certifying Factory Surgeons at Carnoustie (Angus) and Ringwood (Hants).

Births, Marriages, and Deaths.

BIRTHS.

BAKER.—On July 30th, the wife of Ormonde A. Baker, M.B., Langton's Meadow, Farnham Common, Bucks, of a son.

CASSELLS.—On July 28th, at The Old Oak House, Pembridge, Herefordshire, the wife of Dr. David A. K. Cassells, of twin sons.

SHAW.—On July 22nd, at Lower Baggot-street, Dublin, the wife of Captain G. W. B. Shaw, R.A.M.C., of a son.

SPENCER-PAYNE.—On July 30th, at Hempsted Lodge, Woodside Park, the wife of A. Ll. Spencer-Payne, M.R.C.S., L.R.C.P., L.D.S., of a daughter.

MARRIAGES.

SALEEBY—BILLINGE.—On July 30th, at St. Augustine's, Kilburn, Caleb Williams Saleeby, M.D., F.R.S.E., to Muriel Gordon, eldest daughter of the late Rev. Robert Burland Billinge, of Ulverston.

DEATHS.

GORDON.—On July 24th, at Pembroke-mansions, Dublin, Thomas Eagleson Gordon, M.Ch., President, Royal College of Surgeons in Ireland, aged 62 years.

HIGHET.—On July 29th, at a London nursing home, Hugh Campbell Highet, M.D., D.P.H., of Radley House, Winchester, late of Bangkok, Siam, aged 62 years.

N.B.*—*A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

INDEX TO "THE LANCET," VOL. I., 1929.

THE Index and Title-page to Vol. I., 1929, which was completed with the issue of June 29th, is now ready. A copy will be sent gratis to subscribers on receipt of a post-card addressed to the Manager of THE LANCET, 1, Bedford-street, Strand, W.C. 2. Subscribers who have not already indicated their desire to receive Indexes regularly as published should do so now.

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Notes, Comments, and Abstracts.

ARROWROOT,

ITS MEDICINAL AND DIETETIC VALUE.

By JOHN CAMPBELL, PH.D.,

HON. SCIENTIFIC ADVISER TO THE WEST INDIA COMMITTEE.

FOR generations genuine arrowroot has been regarded by the medical profession as a valuable food in sick-room dietary. The word "arrowroot" is derived from the Indian term Ara-ruta, meaning a "mealy root," and it well describes the characters of the rhizome of the *Maranta arundinacea*, grown in the British West Indies, from which the genuine arrowroot is prepared. The plant is a native of tropical America and was formerly largely cultivated in Bermuda, but the manufacture of arrowroot has ceased in that island and is now centred in St. Vincent.

The objects aimed at in the preparation of arrowroot are the preservation of its colour and flavour, with the elimination of fibre and the bitter principles which are present more or less in all starch yielding rhizomes and roots. The fresh rhizomes are washed, pared, washed, and then graded to a fine pulp. The subsequent operations involve frequent dilutions with water and straining before passing to the settling table, where the supernatant fluid is drained off. The residue is then washed until the effluent runs clean, after which it is transferred to the drying house and air dried. The colour and flavour depend upon the efficiency of the washing, straining, and settling processes, and the different grades of arrowroot indicate the degree to which the purifying and eliminating processes are carried.

The manufacture of arrowroot as carried out under present conditions in the West Indies is not based on up-to-date methods; no modern machinery is used and the process is laborious and wasteful. Efforts are now being made by the West India Committee to introduce modern machinery, in properly constructed factories, which will reduce the cost of production, and lower the price of this valuable carbohydrate food.

The statement often met with in text-books that arrowroot is specially prone to absorb moisture and foreign flavours is not justified. In a special research inaugurated by the West India Committee it was found that arrowroot starch was neither better nor worse than other starches in that respect, and that this reputation was probably due to the careless way in which arrowroot was formerly packed for export, and marketed in this country.

The following is an analysis of St. Vincent arrowroot compared with potato, maize, and cassava starch.

Analyses (Willimott).

—	St. Vincent arrowroot.	British arrowroot.		Brazilian arrowroot (cassava starch, Manihot utilissima.)
		Potato starch.	Cornflour (maize starch).	
Moisture ..	15·15	16·20	11·91	14·16
Protein ..	0·10	0·12	0·40	0·18
Fat ..	0·02	0·03	0·10	0·03
Starch ..	84·45	83·37	87·37	85·41
Fibre ..	0·03	0·03	0·05	0·03
Ash ..	0·25	0·25	0·17	0·19
—	100·00	100·00	100·00	100·00

The energy value of St. Vincent arrowroot is 112 calories per ounce. The analysis shows it to be a very pure amyloid food, characterised by an extremely low protein and fibre content; this confirms the statement of most authorities that it leaves practically no residue in the digestive tract. The ash contains calcium, potassium, and iron as phosphates, chlorides, and silicates. The phosphorous content of the ash amounts to 21·2 per cent.

In most text-books the vitamin content of arrowroot is given as nil, but recent experiments made at the Lister Institute appear to show that root starch—i.e., arrowroot—contains a hitherto unnoticed constituent not present in cereal starch. When the protein of the rat diet is dried before being added to the daily ration, certain deficiencies in the nutrition are evident. If, however, arrowroot starch is added to the diet as a carbohydrate constituent, this deficiency is rectified, but not by wheat, rice, or maize starch. The nature of this constituent has not been determined, but if not an actual vitamin, it has an allied action.[1]

[1] See Bio-chemical Journal, 1927, xxi., 713.

The most important property of starch is the quality of forming with water a jelly at a temperature which varies for the different varieties of starch. The starch molecule is generally considered to consist of amylose, found principally in the internal part of the grain, and amylopectin found mainly externally. The amylopectin confers the property of gelatinisation. The amylose is the "granulose" and the amylopectin the "farinose" of the older nomenclature. From the dietetic standpoint the gelatinising properties are the more important, as they concern the breaking up and bursting of the granules and the setting free of the nutrient constituents for digestion. The more thorough the gelatinisation the more rapid and thorough the assimilation and the less the residue of undigested matter. As an average of many tests Willimott obtained the following gelatinisation point of the named starches:

St. Vincent arrowroot..	73° C.	Maize	70° C.
Cassava	66° C.	Potato	65° C.

The high gelatinisation point of St. Vincent arrowroot ensures a thorough breaking down of the starch granules and confirms the observation that arrowroot is the most digestible form of starch.

This conclusion is confirmed by the researches of A. Dobroslavine who found that arrowroot required less saliva to produce a given quantity of sugar than all other starches, and that equal quantities of saliva acting on arrowroot and other starches produced more sugar in the arrowroot digestion in a shorter time than in cereal starches.[2]

In the earliest references the term "arrowroot" was reserved for the starchy products of the various species of the *Maranta*, especially *arundinacea*. Among the substitutes for genuine arrowroot are the following: "British arrowroot" is merely potato starch. "Cornflour" is prepared from maize, and is sometimes sold as "British arrowroot." "Brazilian arrowroot" is the starch prepared from manioc (*Cassava-Manihot utilissima*). Tapioca is prepared from this starch by the addition of water, and drying by heat. Formerly the *Maranta arundinacea* was a source of "Australian arrowroot," but of late years the species Canna has replaced it, the chief being *Canna edulis*, commonly known as tous-les-mois. "East Indian arrowroot" is prepared from various species of *Curcuma*, such as *angustifolia*, *leucorrhiza* and *rubescens*. It is one of the most common adulterants of genuine arrowroot. Another form also termed "East Indian arrowroot" is manufactured in Southern and Eastern Asia, Madras, and the Malabar Coast from Travancore starch. It is known locally as tik-tikur. "Portland arrowroot" is prepared from the lily *Arum maculatum* and the tubers of the *Arum macrorhizum*, yielding 20 per cent. of starch, cultivated in the island of Portland and other South Sea islands, and in India. It is used often as an adulterant of genuine arrowroot. "Tahiti arrowroot" is prepared from the species *Tacca oceanica* or *T.-pinnatifida*. Locally it is known as "pia." Its starch yield averages 28–30 per cent. "Guiana arrowroot" is the starch prepared from the yam (*Dioscorea alata*). In Brazil it is known as farinha-de-cara. It gives a 20 per cent. yield of starch. "Florida arrowroot" or Zanna starch is derived from the tuberous stems of the *Zanna floridana*.

These substitutes, especially the preparations from maize and potato, do not possess the dietetic properties of genuine arrowroot. It is therefore desirable that in all cases "St. Vincent arrowroot" should be specified.

Arrowroot is a valuable food in diarrhœa, those cases where vegetable fibre is contra-indicated, and where a diet is required leaving no residue in the alimentary tract. When used in small quantities in conjunction with milk and heated to the gelatinising point of the starch, it breaks up the coarse curd rendering the milk more digestible. With agar-agar it forms an excellent base for the administration of the mineral salts used in the radiography of gastro-intestinal disease.

[2] Bull. Soc. Chem., 1887, xxv., 452.

THE READESK.

WE have received from Mr. W. Ross Key, of 97, Douglas-street, Glasgow, a sample Readesk, which is an apparatus for holding a book securely and at a proper distance from the eyes when reclining in a chair at any angle or resting on a bed. It consists of an expanding frame (on the principle of the "lazy tongs") for holding the book, with pins to hold down the pages, the frame being kept in a comfortable angle before the face by a cord passing round the neck of the reader. Some little pains have to be spent at first in adjusting the apparatus, but when once in position it is quite satisfactory in use, and should prove a boon not only to invalids, but to readers who like to have a hand free when smoking.

TREATMENT OF ITCHING DERMATOSES.

ACCORDING to M. Friedlander,[1] Lebedjew was the first to try intravenous injections of a 10 per cent. sodium bromide solution in pruriginous affections, and his results led to a scientific enquiry in Vienna, where the advantages of the method were confirmed. Ekzebrol, which is a 10 per cent. solution of strontium bromide in 20 per cent. glucose solution, was the direct outcome of these investifgations, and is prepared for the market by the firm of Tosse (Hamburg.) The drug is administered exclusively by the intravenous route, and during the injection gives rise to a feeling of warmth, which spreads rapidly over the whole body, and of which the patient must be warned. Friedlander has never noted any ill-effects, and in one or two cases without prominent veins he has even ventured to inject the drug deeply into the glutei. This route, however, is painful, and the patients did not submit to more than two injections. The usual procedure is to administer a 10 c.cm. ampoule three times a week.

The results are described as variable. Sometimes the pruritus was controlled after three injections, in other cases as many as 16 had to be given before the symptom disappeared. Ekzebrol, it is stated, can be used both in primary general pruritus of unknown or obscure ætiology, and in that which follows or is associated with psoriasis, lichen ruber planus and eczema. Failures of course occur with this, as with all other methods, if the cause cannot be ascertained and removed.

PUBLIC HEALTH IN KENYA.

A REPORT on the Colony and Protectorate of Kenya, recently issued, states that the land area is 221,800 square miles in extent, and the water area, which includes the larger portion of Lake Rudolf and the eastern waters of the Victoria Nyanza, 4011 square miles. Mount Kenya, after which the colony is named, is 17,040 feet in height, and is capped by perpetual snow and ice. There are no marked seasonal changes such as winter and summer. At high altitudes the diurnal variation of temperature is high, being as much as 30°F. in some places, but the mean temperature varies little from month to month. The range of temperature between different parts of Kenya is very wide. At Lamu, on the coast, the mean shade temperature is 80° F. At Mombasa it is 77°F. In Kisamu, on the Victoria Nyanza it is 72·5°F. In the Rift Valley and highland areas the mean temperature is normally between 58°F. and 65°F. The rainfall is generally well distributed. Precipitation varies considerably with the physical configuration of the colony. According to a census taken in 1926, the number of Europeans in the colony was 12,529, of Asiatics (excluding Arabs), 30,583, and of Arabs 10,577, whilst the estimated African population in 1927 was 2,847,632.

In the section of the report devoted to public health it is stated that after the visit to the colony of Dr. J. B. Orr, of the Rowett Research Institute, in 1926, in connexion with the proposed pasture investigation, the subcommittee of the Civil Research Committee decided to extend the scope of the investigation to problems of human as well as animal nutrition. With funds provided by the Empire Marketing Board, two special research officers have been employed in the country, not as independent investigators, but working in closest collaboration with the local people. During 1927 two new centres, namely Kitui and Teita, were opened in the Native Reserves. A medical officer of health has been appointed to Nakuru, on account of the considerable development which is taking place in the township, and also because of the urgent necessity of instituting sanitary measures at this centre of the grain trade. Besides his duties at Nakuru, the medical officer has been responsible for both Eldoret and Kitale. The first appointment of a medical officer of health to a Native Reserve took place in the latter half of the year, and has proved a complete success. Local native councils have taken an increasing interest in health matters, and large sums of money are being voted by the councils for medical and other objects. On the coast useful measures are being taken against hookworm infestation. The willing coöperation of the people holds out great promise of definite results. Throughout the Reserves generally work is being organised, so that information about diseases, and instruction in simple hygiene, is given, as well as treatment, while at the same time information about the pathological condition of the population is being collected. The country has been free from epidemics of serious disease. Plague requires watching, but no outbreaks of any magnitude occurred during 1927. Small-pox was introduced into Nairobi from India, and uneasiness was caused from the fact that cases came under notice from a considerable area, extending as far out as the Fort Hall Reserve. Original cases had remained concealed. Probably owing to the wholesale vaccination campaign conducted two years ago, the outbreak did not assume any magnitude. The epidemic of malaria experienced in 1926 did not recur, possibly owing to the fact that the rains generally were on the short side. The problem is to be tackled energetically in Nairobi; the Government made available a sum of £20,000, to be expended during 1928, the municipality and railway authorities sharing in the expense. The International Sleeping Sickness Commission, part of whose labours were conducted in Kenya, has completed its work. It was possible during 1927 to conduct a comprehensive population survey of the lake shore. Over 200,000 individuals were examined, and only 380 cases of trypanosomiasis were detected, these mostly being found in three well-defined areas. In one small location, consisting of a population of 800 odd, over 100 cases were found. Measures to deal with the most thickly infested areas are being undertaken. The small area referred to as being especially heavily infected is to be evacuated. Other steps will include clearing of the lake shore and the construction of watering-places. All cases which were found were adequately treated, in order to render them non-infective.

Progress of the scheme for the provision out of loan funds of hospitals in various parts of the country has not been as rapid as was hoped, but a small hospital at Kiltui is practically completed, while work has been commenced on a hospital and other medical buildings at Kakamega Station.

[1] Derm. Woch., June 6th, p. 810.

AN INGENIOUS TRUSS.

THE "Colquhoun" truss for hernia consists of a steel spring, to which is fitted a pneumatic appliance consisting of a back pad situated at the centre of the spring, with air connexions communicating with the front pad or pads, which cover the site of the hernia. The pads are inflated by the wearer to the extent he finds most comfortable; the valve is then closed, and the pressure in the appliance remains even. The back pad serves a double purpose: (1) it substitutes a soft air cushion for the hard spring, and (2) transfers the pressure to the front pads in conformity with the movements of the wearer. The pads are constructed to include some of the well-known product "Sorbo." While rendering them practically immune from puncture, this does not interfere with the automatic movement of the air, and makes it possible to use a much softer pad than can be employed with nearly all steel spring trusses. The softness of these pads allows them to conform readily to the contour of the body, while the action of the spring, combined with the automatic pressure exercised, gives a soft yet firm holding. This pressure, which owing to the construction of the spring occurs only directly under the pads, has a natural lifting tendency on the front pad or pads, instead of a direct inward action. Any cough or sudden movement is resisted first by the air cushion and then by the spring of the truss. Owing to the special construction, it is claimed that perineal straps are unnecessary

The principle on which this appliance is designed is distinctly ingenious, and the truss should prove comfortable to wear. It is manufactured by the Uterpress Co., 65, Atlantic-road, Brixton, London, S.W., and a patent has been applied for.

NEW WOMEN'S WARDS AT GRAVESEND.—The Marchioness of Carisbrooke last week opened new women's wards at the Gravesend and North Kent Hospital.

PRESTON ROYAL INFIRMARY.—The sum of £10,000 has been allocated to the building fund of Preston Royal Infirmary by the trustees of the estate of the late Alderman T. Parkinson, who was thrice mayor of Preston.

NORTHAMPTON GENERAL HOSPITAL.—Mrs. J. G. Sears, of Collingtree Grange, Northamptonshire, has given £5000 to the Northampton General Hospital, £3000 of which is to be allocated to the purchase of radium.

A NEW ORTHOPÆDIC HOSPITAL.—A new hospital for cripples was opened on August 3rd at Harlow Wood, near Mansfield, on a site given by the Duke of Portland. There are two wards of 40 beds each, and the total cost of building and equipment was £35,000.

NEW HOSPITAL AT BOGNOR.—It is proposed to erect at Bognor a county hospital to commemorate the King's convalescence in the neighbouring hamlet of Aldwick. A site, together with a promise of £5250, has been given by an anonymous donor, and a committee has been appointed to further the scheme.